1997

NORTH CAROLINA STATE
UNIVERSITY

# UNDERGRADUATE
# Catalog

This catalog is intended for informational purposes only. Requirements, rules, procedures, courses and informational statements set forth herein are subject to change. Notice of changes will be conveyed to duly enrolled students and other appropriate persons at the time such changes are effected.

NORTH CAROLINA STATE UNIVERSITY

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North Carolina State University

# Undergraduate Catalog

Raleigh, North Carolina

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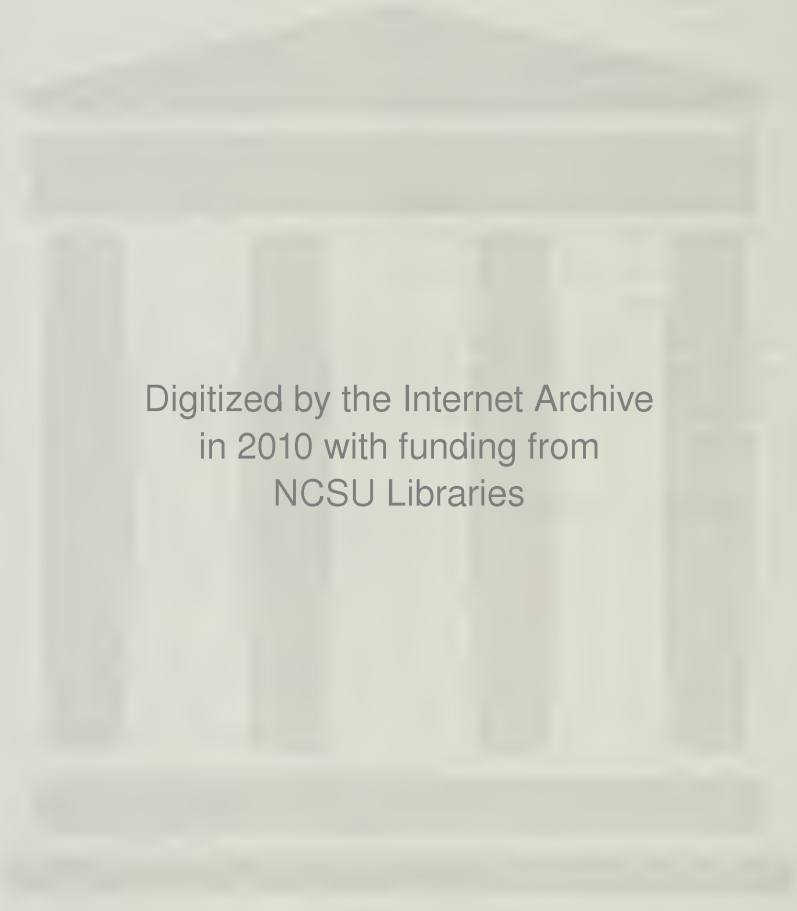

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# North Carolina State University

North Carolina State University is a national center for research, teaching, and extension in the sciences and technologies, in the humanities and social sciences, and in a wide range of professional programs.

Founded March 7, 1887, by the North Carolina General Assembly under the provisions of the national Land-Grant Act, the University has marked more than a century of service to the state and the nation. Sharing the distinctive character of Land-Grant universities nationwide, NC State has broad academic offerings, national and international linkages, and large-scale outreach, extension, and research activities.

**Teaching and Research**

The University is organized into nine colleges, the School of Design, the Graduate School, and the Division of Undergraduate Studies. The colleges are Agriculture and Life Sciences, Education and Psychology, Engineering, Forest Resources, Humanities and Social Sciences, Management, Physical and Mathematical Sciences, Textiles, and Veterinary Medicine. These colleges and schools offer baccalaureate degrees in 89 fields, master's degrees in 80 fields, and doctoral degrees in 51 fields. Together with more than 30 research centers and institutes, these colleges and schools also support a broad spectrum of more than 1,200 scientific, technological, and scholarly research endeavors.

**Outreach and Extension Programs**

As the state's only research university in the land-grant tradition, North Carolina State has the unique mission to serve the citizens of North Carolina through technical assistance, professional development, lifelong education, and technology transfer programs. The primary channel for fulfilling this mission is through the University's outreach and extension programs, centers and institutes that make a positive contribution to the quality of life for over a million of the state's residents on an annual basis. Expertise from the various schools and colleges provides opportunities for improvements in the areas of economics and business, education and training,

natural resources and environmental quality, the humanities, and food and fiber production.

The Division of Continuing Studies is an integral component of the outreach effort, offering access to the knowledge and resources of the University. Annually, over 8,000 lifelong learners register in credit courses, both on and off campus, including those delivered via videocassette, cable and satellite throughout the region, the state, the nation and the world. In addition, Summer Sessions which is administered through the Division has an enrollment of almost 14,000 students. Participation in non-credit, continuing education offerings, a majority of which are implemented in the McKimmon Center, totals over 120,000 annually.

**Campus**

The central campus of the University, located west of the downtown area of Raleigh, consists of 179 major buildings on 623 acres. Adjacent to the central campus are the new 1,000-acre Centennial Campus and the College of Veterinary Medicine campus. Nearby are research farms; biology and ecology sites; genetics, horticulture, and floriculture nurseries; forests; and Carter-Finley Stadium that together extend over 2,700 acres. Elsewhere across the state are research farms and a research forest of 82,000 acres.

**Research Triangle**

NC State is one of the three Research Triangle universities along with Duke University in Durham and the University of North Carolina at Chapel Hill. Within the 30-mile triangle formed by the three universities is the 6,800-acre Research Triangle Park, location of many public research agencies and private research centers of national and international corporations.

**Faculty**

The University has approximately 6,400 employees, of which approximately 1,500 are instructional faculty. Among the many honors and recognitions received by members of the faculty are six memberships in the National Academy of Science and five in the National Academy of Engineering, 48 named professorships, 24 University Distinguished Professorships, 83 Alumni Distinguished Undergraduate Professors, and currently over 307 members of the Academy of Outstanding Teachers.

### Students

In the 1996 fall semester, the university's regular term headcount enrollment totaled 27,169. Included in this number were 18,965 students in undergraduate degree programs, 5,338 in graduate degree programs, and 2,866 Lifelong Education students. The combined undergraduate and graduate enrollments by college were: Agriculture and Life Sciences - 4,802; Design - 702; Education and Psychology - 1,683; Engineering - 6,180; Forest Resources -1,047; Humanities and Social Sciences - 3,114; Management - 2,649; Physical and Mathematical Sciences - 1,309; Textiles - 1,013;Veterinary Medicine - 392, and First Year College - 1,412. The student population included 2,542 African-American students; 1,523 other minority students, and 11,160 female students. Students at the university come from all 50 states, four United States territories, and approximately 90 foreign countries. The international enrollment is a distinctive feature of the institution as nearly 1,100 international students give the campus a cosmopolitan atmosphere.

## UNIVERSITY STUDENT UNION

### Visual and Performing Arts and Activities

Each year the University Student Union provides students with a wide range of opportunities to participate in, study, and enjoy the arts. Center Stage at Stewart Theater annually presents up to 30 professional performing arts events. The Crafts Center offers hands-on course work in a variety of crafts including pottery, fiber arts, photography, flat glass and woodworking. The Dance Program provides credit and non-credit opportunities in dance, with two student dance companies and classes in technique, choreography and performance. The Films Program provides an international film series, a series of independent and experimental film makers, and a popular commercial film series. The Department of Music offers 11 choral and instrumental performance ensembles, available to students for credit and non-credit participation, course work in music theory, history, composition and performance, and an 18-hour music minor. Thompson Theater is the University's student producing theater, staging up to 13 productions annually, offering credit and non-credit participation in acting, direction, stage management and theater design, and an 18-hour theater minor. The Visual Arts Center hosts up to 12 exhibitions annually, and manages the University's permanent collections of textiles, ceramics, paintings, sculpture, furniture, photography and architectural, visual, graphic and products designs.

For addition information on the University Student Union's Visual and Performing Arts and Activities Programs, see the section on Student Activities.

**Athletics**

The University's "Wolfpack" athletic teams are well-known nationally. The men's basketball team won national championships in 1974 and in 1983 and holds 10 Atlantic Coast Conference titles. The football team has been the Atlantic Coast Conference champion five times, co-champion twice, and has played in 16 bowl games. The Wolfpack women's cross-country team won national championships in 1979 and 1980 along with 10 ACC crowns, while the men's and women's soccer teams have both advanced to the NCAA's "final four" in the last six years. The women's basketball team, under the direction of 1988 United States Olympic gold-medal winning coach Kay Yow, has played in 11 of 15 ACC Tournament title games. The wrestling team has won nine ACC titles while the men's swim team has claimed 24 conference championships. Providing additional color and spirit for the games, the cheerleading squad was recognized three times as national champions. Numerous individual NC State athletes have won NCAA titles, national championships, and international honors, including medals in the last four Olympic Games in which the United States has competed.

**Associations**

The University is a member of the National Association of State Universities and Land-Grant Colleges, the American Council on Education, the American Council of Learned Societies, the Association of Governing Boards of Universities and Colleges, the Oak Ridge Associated Universities, the North Carolina Association of Colleges and Universities, and the Cooperating Raleigh Colleges.

## ACCREDITATION

North Carolina State University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (1866 Southern Lane, Decatur, Georgia 30033-4097: Telephone number 404-679-4501) to award the doctoral, master's, baccalaureate, and associate's degrees.

In addition, many of the University's professional programs and departments are accredited by national professional associations, including:

| | |
|---|---|
| Accreditation Board of Engineering and Technology (Environmental Engineering) | 1994 |
| Accreditation Board of Engineering and Technology (all other programs) | 1992 |
| American Animal Hospital Association | 1995 |
| American Association for Accreditation of Laboratory Animal Care | 1993 |
| American Chemical Society | 1996 |
| American Psychological Association | 1996 |
| American Veterinary Medical Association | 1992 |
| Council for Accreditation of Counseling and Related Educational Programs | 1994 |
| Computing Sciences Accreditation Board | 1992 |
| Council on Social Work Education | 1995 |
| Landscape Architectural Accreditation Board | 1993 |
| National Architectural Accrediting Board | 1995 |
| National Association of Schools of Public Affairs and Administration | 1993 |
| National Council for Accreditation of Teacher Education | 1996 |
| National Recreation and Park Association | 1992 |
| Society of American Foresters | 1995 |
| Society of Wood Science and Technology | 1995 |

NC State's Student Health Services was accredited by the Joint Commission on Accreditation of Health care Organizations in 1996.

NC State's Department of Athletics' Division I programs were certified by the National Collegiate Athletic Association in 1995.

## NONDISCRIMINATION POLICY

NC State is committed to equality of educational opportunity and does not discriminate against applicants, students, or employees based on race, color, national origin, religion, sex, age, or disability. Moreover, NC State is open to people of all races and actively seeks to promote racial integration by recruiting and enrolling a larger number of black students.

NC State is dedicated to equality of opportunity within its community. Accordingly, NC State does not practice or condone discrimination, in any form, against students, employees, or applicants on the grounds of race, color, national origin, religion, sex, age, or disability.

NC State commits itself to positive action to secure equal opportunity regardless of those characteristics.

NC State supports the protection available to members of its community under all applicable Federal laws, including Titles VI and VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Sections 799A and 845 of the Public Health Service Act, the Equal Pay and Age Discrimination Acts, the Rehabilitation Act of 1973, the Vietnam Veteran's Readjustment Assistance Act of 1974, Executive Order 11246, and the Americans with Disabilities Act of 1990.

For information concerning the nondiscrimination policy, contact:

Joanne Woodard
Assistant Provost for Equal Opportunity
304 A Holladay Hall
Box 7930
North Carolina State University
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Phone: (919) 515-4559 or 515-3148
E-mail: Joanne_Woodard@ncsu.edu

Further information concerning the following topics, contact the offices listed below:

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Academic Programs, Office of the Provost
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Phone: (919) 515-2194
E-mail: academic@ncsu.edu

The World Wide Web URL to access the NC State *Undergraduate Catalog* is: http://www2.ncsu.edu/ncsu/provost/info/publications/ugcat/

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# Academic Calendar

**SPRING SEMESTER, 1997**

| | | | |
|---|---|---|---|
| January | 8 | Wednesday | First day of classes |
| January | 15 | Thursday | Last day to add a course without permission of instructor |
| January | 20 | Monday | Holiday (Martin Luther King Day) |
| January | 23 | Thursday | Last day to register (includes payment of tuition and fees) or to add a course; last day to withdraw or drop a course with a refund or reduction; last day for undergraduate students to drop below 12 hours. *The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m.* |
| February | 19 | Wednesday | Academic Difficulty Reports due |
| February | 20 | Thursday | Last day to withdraw or drop a course at the 400 level or below without a grade; last day to change from credit to audit at the 400 level or below; last day to change to credit only. |
| March | 7 | Friday | Last day to withdraw or drop a course at the 500 or 600 level without a grade; last day to change from credit to audit at the 500 or 600 level |
| March | 7 | Friday | Spring vacation begins at 10:15 p.m. |
| March | 17 | Monday | Classes resume at 8:05 a.m. (8:35 a.m. Centennial Campus). Registration advising begins for 1997 summer sessions and fall semester |
| March | 26 | Wednesday | TRACS registration opens |
| March | 28 | Friday | Holiday (Good Friday) |
| April | 25 | Friday | Last day of classes |
| April 28 - | May 6 | Mon-Tues | Final Examinations |
| May | 10 | Saturday | Commencement |

**SUMMER SESSIONS, 1997**

*First Session*

| | | | |
|---|---|---|---|
| May | 20 | Tuesday | First day of classes |
| May | 21 | Wednesday | Last day to add a course without permission of instructor |
| May | 23 | Friday | Last day to register (includes payment of tuition and fees) or to add a course; last day to withdraw or drop a course with a refund. *The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m.* |

| | | | |
|---|---|---|---|
| June | 3 | Tuesday | Last day to withdraw or drop a course at the 400 level or below without a grade; last day to change from credit to audit at the 400 level or below; last day to change to credit only |
| June | 4 | Wednesday | Last day to withdraw or drop a course at the 500 or 600 level without a grade; last day to change from credit to audit at the 500 or 600 level |
| June | 20 | Friday | Last day of classes |
| June | 23-24 | Mon-Tues | Final Examinations |

***Second Session***

| | | | |
|---|---|---|---|
| July | 1 | Tuesday | First day of classes |
| July | 2 | Wednesday | Last day to add a course without permission of instructor |
| July | 4 | Friday | Holiday (Independence Day) |
| July | 7 | Monday | Last day to register (includes payment of tuition and fees) or to add a course; last day to withdraw or drop a course with a refund.<br>*The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m.* |
| July | 16 | Wednesday | Last day to withdraw or drop a course at the 400 level or below without a grade; last day to change from credit to audit at the 400 level or below; last day to change to credit only |
| July | 17 | Thursday | Last day to withdraw or drop a course at the 500 or 600 level without a grade; last day to change from credit to audit at the 500 or 600 level |
| August | 4 | Monday | Last day of classes |
| August | 6-7 | Wed-Thurs | Final Examinations |

**FALL SEMESTER, 1997**

| | | | |
|---|---|---|---|
| August | 18 | Monday | First day of classes |
| August | 25 | Monday | Last day to add a course without permission of instructor |
| September | 1 | Monday | Holiday (Labor Day) |
| September | 2 | Tuesday | Last day to register (includes payment of tuition and fees) or to add a course; last day to withdraw or drop a course with a refund; last day for undergraduate students to drop below 12 hours.<br>*The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m.* |
| September | 19 | Friday | Academic Difficulty Reports due |

| | | | |
|---|---|---|---|
| September | 30 | Tuesday | Last day to withdraw or drop a course at the 400 level or below without a grade; last day to change from credit to audit at the 400 level or below; last day to change to credit only |
| October | 10 | Friday | Fall vacation begins at 10:20 p.m. |
| October | 15 | Wednesday | Classes resume at 8:05 a.m. (8:35 a.m. Centennial Campus) |
| October | 17 | Friday | Last day to withdraw or drop a course at the 500 or 600 level without a grade; last day to change from credit to audit at the 500 or 600 level |
| October | 20 | Monday | Registration advising begins for 1998 spring semester |
| November | 26 | Wednesday | Thanksgiving vacation begins at 10:20 p.m. |
| December | 1 | Monday | Classes resume at 8:05 a.m. (8:35 a.m. Centennial Campus) |
| December | 5 | Friday | Last day of classes |
| December | 8-16 | Mon-Tues | Final Examinations |
| December | 17 | Wednesday | Fall Graduation Exercise |

**SPRING SEMESTER, 1998**

| | | | |
|---|---|---|---|
| January | 5 | Monday | First day of classes |
| January | 12 | Monday | Last day to add a course without permission of instructor |
| January | 19 | Monday | Holiday (Martin Luther King Day) |
| January | 20 | Tuesday | No classes |
| January | 21 | Wednesday | Last day to register (includes payment of tuition and fees) or to add a course; last day to withdraw or drop a course with a refund; last day for undergraduate students to drop below 12 hours. *The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m.* |
| February | 6 | Friday | Academic Difficulty Reports due |
| February | 18 | Wednesday | Last day to withdraw or drop a course at the 400 level or below without a grade; last day to change from credit to audit at the 400 level or below; last day to change to credit only |
| March | 6 | Friday | Spring vacation begins at 10:20 p.m. |
| March | 6 | Friday | Last day to withdraw or drop a course at the 500 or 600 level without a grade; last day to change from credit to audit at the 500 or 600 level |
| March | 16 | Monday | Classes resume at 8:05 a.m. (8:35 a.m. Centennial Campus) |
| March | 16 | Monday | Registration advising begins for 1998 summer sessions and fall semester |

| | | | |
|---|---|---|---|
| April | 8-9 | Wed-Thurs | No classes |
| April | 10 | Friday | Holiday (Good Friday) |
| May | 1 | Friday | Last day of classes |
| May 4 - May | 12 | Mon-Tues | Final Examinations |
| May | 16 | Saturday | Commencement |

**SUMMER SESSIONS, 1998**

***First Session***

| | | | |
|---|---|---|---|
| May | 25 | Monday | First day of classes |
| May | 26 | Tuesday | Last day to add a course without permission of instructor |
| May | 28 | Thursday | Last day to register (includes payment of tuition and fees) or to add a course; last day to withdraw or drop a course with a refund<br>*The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m.* |
| June | 8 | Monday | Last day to withdraw or drop a course at the 400 level or below without a grade; last day to change from credit to audit at the 400 level or below; last day to change to credit only |
| June | 9 | Tuesday | Last day to withdraw or drop a course at the 500 or 600 level without a grade; last day to change from credit to audit at the 500 or 600 level |
| June | 26 | Friday | Last day of classes |
| June | 29-30 | Mon-Tues | Final Examinations |

***Second Session***

| | | | |
|---|---|---|---|
| July | 4 | Saturday | Holiday (Independence Day) |
| July | 6 | Monday | First day of classes |
| July | 7 | Tuesday | Last day to add a course without permission of instructor |
| July | 9 | Thursday | Last day to register (includes payment of tuition and fees) or to add a course; last day to withdraw or drop a course with a refund.<br>*The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m.* |
| July | 20 | Monday | Last day to withdraw or drop a course at the 400 level or below without a grade; last day to change from credit to audit at the 400 level or below; last day to change to credit only |
| July | 21 | Tuesday | Last day to withdraw or drop a course at the 500 or 600 level without a grade; last day to change from credit to audit at the 500 or 600 level |

| | | | |
|---|---|---|---|
| August | 7 | Friday | Last day of classes |
| August | 10-11 | Mon-Tues | Final Examinations |

**FALL SEMESTER, 1998**

| | | | |
|---|---|---|---|
| August | 17 | Monday | First day of classes |
| August | 24 | Monday | Last day to add a course without permission of instructor |
| August | 31 | Monday | Last day to register (includes payment of tuition and fees) or to add a course; last day to withdraw or drop a course with a refund; last day for undergraduate students to drop below 12 hours. *The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m.* |
| September | 7 | Monday | Holiday (Labor Day) |
| September | 21 | Monday | Academic Difficulty Reports due |
| September | 28 | Monday | Last day to withdraw or drop a course at the 400 level or below without a grade; last day to change from credit to audit at the 400 level or below; last day to change to credit only |
| October | 9 | Friday | Fall vacation begins at 10:20 p.m. |
| October | 14 | Wednesday | Classes resume at 8:05 a.m. (8:35 a.m. Centennial Campus) |
| October | 16 | Friday | Last day to withdraw or drop a course at the 500 or 600 level without a grade; last day to change from credit to audit at the 500 or 600 level |
| October | 19 | Monday | Registration advising begins for 1999 spring semester |
| November | 25 | Wednesday | Thanksgiving vacation begins at 10:20 p.m. |
| November | 30 | Monday | Classes resume at 8:05 a.m. (8:35 a.m. Centennial Campus) |
| December | 4 | Friday | Last day of classes |
| December | 7-15 | Mon-Tues | Final Examinations |
| December | 16 | Wednesday | Fall Graduation Exercise |

*This calendar is subject to periodic review and revision. Please consult the University Registrar to determine if changes have been made (515-2576).*

# Academic Fields of Study and Degrees

## UNDERGRADUATE DEGREES

*School of Design*

architecture (fifth-year program); environmental design in architecture; art and design; industrial design; graphic design; landscape architecture

*College of Agriculture and Life Sciences*

agricultural business management; agricultural and environmental technology, agricultural and extension education; agronomy; animal science; applied sociology (including concentration in criminal justice); biochemistry; biological engineering; biological sciences; botany; environmental sciences; fisheries and wildlife sciences; food science; horticultural science; medical technology; micro-biology, natural resources; poultry science;
pre-dental, pre-medical, pre-optometry and pre-veterinary options; zoology.

*College of Education and Psychology*

education, general studies; health occupations teacher education; marketing education for teachers; mathematics education; middle grades education; psychology (including option in human resource development); science education; technical education; technology education.

*College of Engineering*

aerospace engineering; biological engineering; chemical engineering; civil engineering; computer engineering; computer science; construction engineering and management; electrical engineering; engineering; environmental engineering; industrial engineering; industrial engineering (furniture manufacturing option); materials science and engineering; mechanical engineering; nuclear engineering; textile engineering.

*College of Forest Resources*

environmental sciences; forest management; natural resources; parks, recreation, and tourism management; pulp and paper science and technology; wood products

*College of Humanities and Social Sciences*

communication; English; English (including options in teacher education and writing-editing); French (including an option in teacher education); history; multidisciplinary studies; philosophy; political science (including an option in criminal justice); religious studies; social studies education option (in history, political science, or sociology); sociology (including an option in criminal justice); Spanish (including an option in teacher education); social work.

*College of Management*

accounting; business management; economics

*College of Physical and Mathematical Sciences*

chemistry; environmental sciences; geology; mathematics; meteorology; natural resources; physics; statistics

*College of Textiles*

textile chemistry; textile engineering; textile and apparel management; textile materials science; textile technology.

## PRE-PROFESSIONAL PROGRAMS

**Pre-Law Advising Program.** Law schools neither prescribe nor recommend a particular undergraduate curriculum for prospective candidates. A student may prepare for law school by a careful use of electives within any of the baccalaureate curricula offered by the nine undergraduate colleges and schools. The pre-law adviser for the University assists any student with an interest in law with selection of appropriate electives and concentrations. The pre-law adviser also works with the Pre-Law Students' Association (PLSA), which is open to all interested students. The PLSA invites outside speakers to make presentations about law schools and careers in the law. In addition, the group makes at least one and sometimes two visits per

year to local law schools where the students can attend classes and visit with directors of admissions. The Pre-Law Advising Program is administratively housed within the Division of Undergraduate Studies. For further information, consult Arlene Ugbaja in the Pre-Law Advising Office, B-3 Nelson Hall, (919) 515-5597.

**Pre-Medicine, Pre-Dentistry, and Pre-Optometry Programs.** Professional schools seek broadly educated students from any four-year undergraduate curriculum offered at North Carolina State University. Thus, students should adopt a primary departmental major that suits their interests as an approach to entering a professional school and a desirable alternative should applicants not be accepted into professional school.

The program of study should include the minimal english, science and mathematics courses listed under the heading **Pre-Medical Sciences** (see Pre-Medical Sciences section of this catalog). Further, the student should seek:

- courses that develop reading, writing and critical thinking skills,
- opportunities in undergraduate research and
- experience in hospitals, clinics, dental and optometry offices or nursing homes.

**The University Preprofessional Health Sciences Review Committee** assists students in preparing applications and in providing evaluations to professional schools. For further information, consult Professor John Roberts, committee chairman or the program associate, Nancy Cochran (919-515-3293). Detailed pre-professional information may be viewed on the World Wide Web at: **http://www2.ncsu.edu/ncsu/cals/pre_proff/booklet/sa2mdos.index.html**

**Pre-Veterinary Program.** This program of study which is offered by the College of Agriculture and Life Sciences may be taken by students majoring in animal science, poultry science, zoology, or biological sciences as well as in many other science curricula, such as biochemistry or chemistry. If a student is accepted to veterinary medical school before completion of their undergraduate degree, some course credits may be transferable from the veterinary program toward completion of the Bachelor of Science degree. Arrangements for this procedure should be made with the degree-granting school or department prior to entering veterinary college. For further information, contact the Academic Programs Office of the College of Agriculture and Life Sciences, (919) 515-2614 or the Admissions Office for Veterinary Students of the College of Veterinary Medicine, (919) 829-4205, for general information concerning admission to the Doctor of Veterinary Medicine programs at NC State.

## UNDERGRADUATE MINORS

The following undergraduate minors are available to undergraduate degree students at NC State:

Accounting
African-American Studies
Agricultural Business Management
Animal Science
Anthropology
Apparel Technology
Applied Sociology
Arts Studies
Biological Sciences
Botany
Business Management
Chemical Engineering
Chinese Studies
Classical Greek
Classical Studies
Cognitive Science
Computer Programming
Design
Economics
English
Entomology
Environmental Science
Film Studies
Fitness Leadership
Food Science
Forest Management
French
Furniture Manufacturing
Genetics
Geology
German
Graphic Communications
History
Horticultural Science
Industrial Engineering
International Studies
Italian Studies
Japanese
Japan Studies
Journalism
Linguistics
Materials Science and Engineering
Mathematics
Meteorology
Microbiology
Music
Nutrition
Outdoor Leadership
Parks,Recreation,and Tourism Management
Philosophy
Physical Education (Coaching Emphasis)
Physics
Political Science
Poultry Science
Psychology
Pulp and Paper Technology
Religious Studies
Russian Studies
Science, Technology, and Society
Social Work
Sociology
Soil Science
Spanish
Statistics
Technology Education
Textile Chemistry
Textile Technology
Textile and Apparel Management
Theater

Women's Studies
Wood Products
World Literature
Zoology

## AGRICULTURAL INSTITUTE

Admission to this two-year program requires high school graduation and a letter of recommendation. The program does not carry college credit. An Associate of Applied Science degree is awarded. Fields of study are:

Agribusiness Management
Agricultural Pest Control
Field Crops Technology
Food Processing, Distribution, and Service
General Agriculture
Livestock Management and Technology (General Livestock, Poultry, and Swine Options)
Ornamentals and Landscape Technology
Turfgrass Management

## GRADUATE DEGREES

Consult the *Graduate Catalog* or the Graduate School for information on graduate programs and admissions procedures:

Graduate School, 103 Peele Hall, Box 7102, North Carolina State University, Raleigh, NC 27695-7102, (919) 515-2872

# Arts Studies

NC State offers a rich variety of courses in the history, analysis, and production of the arts - dance, film, music, theater, visual arts. Many of these courses are open to students without prerequisite, and are offered by 13 departments in four different colleges of the university.

In addition to these courses, most of which focus on a single art form, the Division of Multidisciplinary Studies offers special topics courses (MDS 295, 494, 495) each of which deals with several arts media or with the arts in connection with science and technology; information about these courses, which change each year, is available from the Office of Multidisciplinary Studies.

For students who want to concentrate in Arts Studies, an academic minor is available. In addition, there are minors in Music, Theater, Design, and Film Studies. Students may also major in Multidisciplinary Studies with a concentration in Arts Studies. This program makes it possible for students to prepare themselves, for example, for graduate programs in art conservation or medical illustration.

Opportunities for students to participate in arts activities include many instrumental and choral organizations, student productions in Thompson Theater, craft instruction and facilities in the Craft Center, and the exhibitions of the Visual Arts Program. These activities, many of which are integrated with academic courses, are described in more detail under "Student Activities" in this section of the catalog.

# Honors and Scholars Programs

## UNIVERSITY SCHOLARS PROGRAM

*"Man's mind stretched to a new idea, never goes back to its original dimension" - Oliver Wendell Holmes.*

Holmes was right, of course, and the University Scholars Program (USP) of North Carolina State University accepts this dictum as a challenge: To provide promising, academically talented students with a variety of mind-stretching and unique educational experiences, both in and outside of the classroom, and to encourage these outstanding students to perform at the highest level of achievement of which they are capable.

Co-sponsored by University Housing in the Division of Student Affairs, the First Year College, the School of Design and the Colleges of Agriculture and Life Sciences, Education and Psychology, Engineering, Forest Resources, Humanities and Social Sciences, Management, Physical and Mathematical Sciences, and Textiles, the USP combines special academic offerings with a series of cocurricular and extracurricular opportunities. To successfully complete the USP a student must graduate with an overall Grade Point Average of at least 3.250, complete a minimum of 21 hours of Honors/Scholars courses with an "Honors GPA" of at least 3.000, and satisfactorily participate in the USP Forum Series.

Students in the USP may enroll in special Honors or Scholars sections of basic courses in the humanities and social sciences, mathematics and natural sciences. These sections are deliberately kept small and are taught by instructors known for their excellence in teaching. All of these classes fulfill requirements for graduation from NC State, thus students are not required to take additional courses in order to participate in the USP. To ensure that University Scholars are able to register for their required Scholars Forum, Honors and Scholars courses, and regular, non-Scholars sections of courses, USP participants receive "Scholars Advanced Scheduling" privileges.

Academic work in the Scholars Program is complemented and enriched by a series of special events, called the Scholars Forum. These weekly activities are intended to broaden each student's personal, professional, and cultural horizons. Forum events may include conversations with distinguished faculty members, addresses by major public figures, debates and discussions on significant public issues, and visits to museums and historic sites. They may also include introductions to cultural activities, viewing of significant films, and explorations of opportunities open to students for personal growth and foreign study.

University Scholars are also expected to attend cultural events on the NC State campus and in the Raleigh community. Tickets for many of these events are provided as part of the program. Scholars are also provided the opportunity to attend a range of international films and events, both on campus and at the North Carolina Museum of Art. Additionally, the Scholars Council, a body made up of student representatives from each NC State school and college, plans a variety of social activities and special trips for University Scholars, and arranges for USP students to participate in worthwhile community service projects.

To encourage the development of close working relationships and friendships among participants in the USP, Scholars are invited and encouraged to live in the same residence hall, Sullivan, located on West Campus. To assist and communicate

effectively with these students, the USP office is also located in Sullivan Residence Hall. Scholars are guaranteed housing on campus as long as they remain active in the USP.

Finally, through the University Scholars Program, NC State is a member and participates in the activities of the North Carolina Honors Association, the Southern Regional Honors Council and the National Collegiate Honors Council.

For more information concerning the USP, contact: University Scholars Program, Box 7316, NCSU, Raleigh, NC 27695-7316, Phone: (919) 515-2353, Fax: (919) 515-7168

## HONORS PROGRAMS

Honors programs are offered by the Colleges of Agriculture and Life Sciences, Forest Resources, and Textiles and by most departments in the Colleges of Physical and Mathematical Sciences, and Humanities and Social Sciences. Detailed descriptions of the individual honors programs are available in the listings of the relevant college or department. Honors participants benefit from a more individualized and rigorous academic program in their major area of interest. A minimum of nine credit hours in courses drawn from at least two of the three following categories is required: special courses for honors students, advanced (graduate) courses, and independent studies. To successfully complete the program, students must finish the designated course work and achieve an overall grade point average of at least 3.250.

Students who complete an honors program are recognized by having an honors seal on their diplomas, an "H" beside their names in the commencement program, the phrase "Completed Honors Program in (college, department or major)" on their permanent transcripts, and their names in the Honors Convocation program.

The minimum admission requirement is a 3.000 (B) grade point average over all courses and a 3.250 grade point average in their major after at least nine credit hours of course work for the major or other course work approved by the major department. Many of the individual programs have higher admission requirements. Students who believe they are eligible and are interested in more information about honors program opportunities should contact the Associate Dean for Academic Affairs of their college or school or the Honors Director of their department or the Director of the University Honors Council.

# Scholarships

## UNIVERSITY ACADEMIC SCHOLARSHIPS FOR ENTERING FRESHMEN

NC State offers a competitive scholarship program for entering freshmen to recognize and to encourage exceptional academic ability and achievement. Graduating seniors of good character and leadership potential who have excelled in their high school academic and extracurricular endeavors may apply for a large number of merit award opportunities at the University. Financial need is not a consideration in the selection of recipients for these awards.

Each year the office of Merit Awards and Special Scholarships conducts a nation-wide competition for approximately 80 university-wide scholarships (available to students entering any academic major). Over 125 *other* scholarships are also offered through individual colleges and departments. Completion of the John T. Caldwell Scholarship application packet, which consists of the student's application as well as other supporting documents, assures consideration for the 80 university-wide scholarships, including the prestigious John T. Caldwell Alumni Scholarship. The application packet is available from the Merit Awards Office by August preceding the student's senior year in high school, and the application deadline is November 1 of the senior year.

Finalists are identified from the entire applicant pool in mid-January and are invited to the NC State campus for personal interviews.

**The John T. Caldwell Alumni Scholarship** is sponsored by the NC State Alumni Association. At least 20 prestigious Caldwell Scholarships valued at $4,000/year (up to $18,000 for four years) for in-state recipients and $7,500/year (up to $32,000 for four years) for out-of-state recipients are offered each year. This excellent scholarship seeks students who demonstrate both academic excellence and strong leadership potential. It includes stipends for valuable personal enrichment and internship experiences.

Yearly renewal of the Caldwell and the other University-wide renewable awards assumes the maintenance of a 3.000 grade point average once a recipient is engaged in full-time course work at the University.

Many other scholarships, ranging from $2,000 freshmen year awards up to other renewable awards, such as the Caldwells are available in each year's competition.

In order to apply, students must meet **two** of the following criteria - high school grade point average of 3.850 (unweighted) or 4.000 (weighted), be ranked in the top

5 percent of their class, have a SAT total score of 1200 or above. Caldwell scholarship application packets are available from:

The Office of Merit Awards and Special Scholarships, NCSU, 2119 Pullen Hall, Box 7342, Raleigh, North Carolina 27695-7342

Telephone inquiries are welcome: (919) 515-3671

### CURRICULUM-SPECIFIC FRESHMAN MERIT SCHOLARSHIPS

There are a number of merit scholarships for students entering a particular college or major. The number and value of these awards vary greatly throughout the different colleges. The individual college Dean's Office is the best place to inquire for additional information on available awards and whether there is an application required for consideration.

Most of the college-sponsored scholarships have a March 1 date for submission of an application, when required.

### COLLEGE AND DEPARTMENTAL SCHOLARSHIPS FOR CONTINUING STUDENTS

A number of scholarships based upon academic achievement are administered directly through some of the academic departments for students engaged in full-time course work at the University (see the "Colleges, Departments, and Programs of Study" section of this catalog). A continuing student should contact the college/department of his or her academic major for information about specific scholarship opportunities that do not require the filing of financial information.

# Special Academic Programs

### EVENING UNDERGRADUATE DEGREE PROGRAMS

The College of Humanities and Social Sciences offers courses toward complete undergraduate degree programs during the evening hours for adult part-time students. Sufficient courses are generally offered in the evening hours to complete majors in communication-public and interpersonal option, communication-public relations option, English, English-rhetoric, writing and language option, history, multidisciplinary studies, political science, sociology, criminal justice option in political science or sociology, and Spanish. For more information, contact the

Coordinator of Evening Programs, College of Humanities and Social Sciences, Box 8101, NC State, Raleigh, NC 27695-8101, (919) 515-3638 or 515-2467.

## NON-DEGREE CERTIFICATE PROGRAMS

Non-degree certificate programs are prescribed sets of regular academic courses which offer limited but structured continuing education opportunities. They are designed expressly for Lifelong Education students. Students enrolled in undergraduate or graduate degree programs at NC State are not eligible to participate simultaneously in these certificate programs. Satisfactory completion of the prescribed courses is recognized by the issuing of a certificate from the department or college that offers that program.

Certificate programs are currently offered by the following academic units: Department of Adult and Community College Education - **Studies in Gerontology** (PBS students only) and **Training and Development** (PBS students only); Department of Communication - **Human Communication**, with track options in Public and Interpersonal Communication, Communication Disorders, Mass Communication, Public Relations, and Theatre; Department of Computer Science - **Computer Programming** (PBS students only); Department of English - **Professional Writing**; Department of Political Science and Public Administration - **Management Development** (PBS students only) with program areas such as Adult and Community College Administration, Data Management, Financial Management, Human Resources Management, Management Control Systems, Public Affairs, Urban Administration, Program Evaluation, Administration of Justice, Recreation Resources Management, and Association/Non-profit Management; and the College of Textiles - **Textiles** with subject areas including Apparel Production, Dyeing and Finishing, Fabric Production, Textile Fibers and Polymers, Fiber Science for Textile Conservators, Textile Administration, Textile Fundamentals, and Yarn Manufacturing.

For information concerning enrollment requirements and prescribed courses for a particular certificate program, consult the department or college offering that program or the Office of Adult Credit Programs & Summer Sessions, (919) 515-2265.

## SUPPLEMENTAL INSTRUCTION

Supplemental Instruction (SI) is offered to students in most sections of freshman and sophomore chemistry and selected sections of biology, computer science, mathematics and physics. SI sessions are attended voluntarily by students with a wide range of academic backgrounds and aptitudes. They are open to all students

who want to improve their understanding of the course material. Three or four sessions are offered at various times each week, usually during the late afternoon and early evening.

SI sessions give students a chance to get together with peers to compare notes, to discuss concepts, to work problems, and to develop strategies for studying the material. The sessions are led by trained university tutors called SI leaders. Leaders are usually undergraduate students who previously excelled in the course and who have been selected for their outstanding communication abilities. The leaders attend class, take notes, and do homework assignments in preparation for the SI sessions.

During the semester, students may attend as many SI sessions as they wish. Session attendance is recorded for use in data analysis and program improvement. The data reveals a consistent record of higher grades and lower drop-out rates for students who regularly attend. Grades also steadily improve with increased SI attendance. Students attending SI at least once a week average a whole letter grade higher than students who infrequently attend.

For more information, contact the Undergraduate Studies Tutorial Center, 515-3163.

## THE PEER MENTOR PROGRAM

The Peer Mentor Program is a student peer-helper program in which academically talented African-American upperclassmen serve as "mentors" to freshmen African-American students. The program stresses the mentoring process as a positive factor in the successful recruitment, advancement, and graduation of African-American students at this University. The Peer Mentor Program assists the freshmen in making a successful transition to campus life by providing them with a supportive contact person who acts as a sounding board for personal adjustment concerns; interprets University policies and procedures; makes proper referrals to appropriate University services; and suggests to freshmen various strategies for academic, emotional, and social success at NC State. Moreover, an integral component of the program is a focus on cultural awareness and identity as a means of helping African-American peer mentors and freshmen to positively affirm their skills and capabilities.

All incoming African-American freshmen are assigned a peer mentor prior to their arrival on campus in the fall. Whenever possible, the freshmen are paired with upperclassmen who are in the same major or college. Peer mentors are trained in "helping skills" and possess a working knowledge of the campus. Thus, they play a

significant role in fostering in the freshman student a positive self-esteem and an appreciation of the potential benefits and rewards of college life.

## COOPERATING RALEIGH COLLEGES

The Cooperating Raleigh Colleges (CRC) is a voluntary organization comprised of NC State, Meredith College, Peace College, St. Augustine's College, St. Mary's College, and Shaw University for the purpose of developing and conducting cooperative educational activities. The organization provides the opportunity for students to enroll at another institution for a course or courses not offered on their home campus. Other activities include a cooperative library arrangement, joint student activities, and faculty cooperation and interchange.

Any NC State *undergraduate degree* student who is enrolled in at least eight credit hours on the NC State campus may take a course at another Raleigh college during a fall or spring semester (except that men may not enroll in courses at Peace College) provided that (a) the course is not taught on the NC State campus and (b) the adviser and dean consider the course educationally desirable.

Students may not register for more than a total of two courses in any semester at other CRC colleges. Under extenuating circumstances, exceptions for an additional course registration may be approved by the requesting student's school dean.

Home campus students have first priority in class assignments. Courses taken at other institutions may be used as free electives and as alternatives to restricted electives, if so approved by the student's adviser and dean. Credits earned in this manner may apply toward fulfilling graduation requirements, but grades from other CRC institutions are not used in computing a student's NC State grade point average. Under this agreement, regular tuition and fees are paid to NC State. Certain special fees may be required for special courses at other colleges, and the student is responsible for paying such fees. During the summer, there is no interinstitutional program with local colleges. A student desiring to take a summer course must register directly with the institution offering the course.

*Note: Lifelong Education students may not register for courses as interinstitutional students.*

## NATIONAL STUDENT EXCHANGE PROGRAM

NC State is one of over 135 colleges and universities in the United States belonging to the National Student Exchange Program. Each year an opportunity is provided for NC State students to study at one of the other participating schools and still pay the same tuition and fees they pay at NC State, thus avoiding the red tape normally

associated with a change of school. Students returning from exchange reflect an increased feeling of independence, self-reliance and self-confidence, and a better appreciation of home region, family and home campus. A major impact of the exchange year has been an increased awareness and appreciation for the vast differences in ideas and values found in different geographic locations. Eligible students must be an undergraduate with a 2.500 grade point average or better and be selected by a screening committee. Preference is given to North Carolina residents. For further information contact the National Student Exchange Office in 2120 Pullen Hall, (919) 515-3499.

### NORTH CAROLINA STATE FELLOWS PROGRAM

NC State offers a self-development experience known as the North Carolina State Fellows Program. The program is designed to assist outstanding, talented students to develop their leadership potential at an accelerated pace, and to accomplish this in ways not usually afforded by the University. Each year approximately 30 new freshmen are selected to participate in the program as Fellows. The program seeks to identify students of exceptional ability and motivation and to encourage their development as potential leaders for business, governmental, educational and other professional communities. The program attempts to fulfill its goal by providing training and developmental opportunities.

# International Programs and Activities

### INTERNATIONAL STUDENTS

About 1,200 international students from approximately 87 countries attend the University and enrich the campus and community. The International Student Office assists these students with immigration and passport matters, currency permits, and medical, personal, and social concerns.

International applicants are carefully screened for evidence of English language proficiency, adequate finances, and academic credentials indicating excellent potential for success. *The minimum TOEFL requirement for admission consideration to NC State is 550 with scores of at least 50 on two sections and no score lower than 45.*The Lifelong Education Student category is not available to persons on temporary visas. The University has authority to issue Forms I-20 for F-1 visas and Forms IAP-66 for J-I visas to fully qualified individuals.

An orientation program for new international students is conducted during the week preceding the fall and spring semesters.

International students are required to purchase the University student insurance policy or provide proof of agency sponsor coverage. Special courses in English for Foreign Students (FLE) are required for those whose scores on the Test of English as a Foreign Language (TOEFL) are sufficiently high for admission but who need further instruction to perform well academically.

The International Student Committee of the Union Activities Board includes international students from across campus, offering and promoting programs of cultural enrichment in an atmosphere of mutual respect and cooperation for members of the campus community from all cultures. Program highlights include International Nights, featuring ethnic meals and entertainment, and Global Speak, a program for conversation partners.

Interested students should contact the Student Center Activities Office, 515-2451, or the Union Activities Board, 515-5918.

## SUMMER INSTITUTE IN ENGLISH FOR SPEAKERS OF OTHER LANGUAGES

The Summer Institute in English for Speakers of Other Languages is a five-week, intensive English language program for students from other countries. It is especially good for students who intend to pursue university studies or specialized training programs in the United States in the fall. The institute, which is jointly sponsored by the Department of Foreign Languages and Literatures and the Division of Continuing Education, is held from early July to early August each summer. It is designed to provide students with intensive instruction and practice in the use of the English language. Emphasis is on developing integrated oral and written skills in English.

The institute also offers orientation to American life and institutions to give students insight into life in the United States and to help them to adjust to the new environment. There are films, lectures by guest speakers, and field trips on weekends to places of historic, cultural, and scenic interest.

Prospective students usually have studied English and have some experience with spoken English prior to enrolling in the institute. However, all levels from beginners to advanced are welcome.

Admission to the institute does not imply admission as a degree candidate at NC State or any other campus of the University of North Carolina System.

The TOEFL (Test of English as a Foreign Language) is administered to students who wish to take it at the end of the program. Since this is an institutional

administration of the test, scores are only accepted by the Admissions Office and Graduate School at NC State.

For information, contact Dr. John Levis at 515-9299 or levis@social.chass.ncsu.edu

## ALEXANDER INTERNATIONAL PROGRAM

The Alexander International program is a residence hall community for both American and international students. The 174 resident members of the program share the common goal of developing their understanding of different cultures and countries and developing cross-cultural relationships. The 87 American students and the equal number of international students, representing approximately 40 foreign countries, become more sensitive to the values of different peoples, systems of government, economic structures, and religions. These goals are achieved through informal interactions, social and educational programming, and American and international roommate pairing.

Program activities in past years have included both an international dinner and international coffeehouse series, emphasizing customs, foods, and entertainment from various cultures. Workshops on cultural differences, cross-cultural communication and relationships, international employment opportunities, and overseas studies are regularly included in the annual calendar of programs and activities. These activities provide an opportunity for American students to add an international dimension to their education while attending NC State.

Participation in this international program is selective and based upon potential contributions to the program. Students are expected to be active participants, to initiate programming, and to be supportive of the program goals. Students interested in applying or wishing additional information should inquire at 105 Alexander International Hall, (919) 515-2925.

## STUDY, TRAVEL, AND SHORT-TERM EMPLOYMENT ABROAD

The Study Abroad Office assists students who would like to study, do an academic internship, volunteer, or work in another country. Opportunities are available for the summer, semester, or year, and many programs cost about the same as studying at NC State. The Study Abroad Office administers approximately $30,000 dollars in campus-based scholarships for study abroad each year, in addition to national scholarship competitions such as Fulbright and NSEP. Students may also use their financial aid to study abroad.

**Study Programs**

Study programs abroad allow students to take course work overseas in their major and/or minor field, and/or fulfill general education requirements. Programs are available for the summer, the semester, or the year. Many programs have no foreign language requirement. There are four basic types of study abroad programs at NC State.

NC State Exchange Programs are available in England, the Netherlands, Sweden, Germany, France, Finland, Costa Rica, Japan, and Australia. There are also special School of Design exchanges in several locations. Students on these exchanges pay regular NC State tuition. Room and board costs are paid to the host institution, but are typically very similar to those at NC State. Requirements include a GPA of at least 2.750 (some exchanges require a 3.000) and, for programs in Germany, France, and Costa Rica, completion of at least the 202 level of language study.

ISEP Exchange Programs are available in over 30 countries in Asia, Africa, Europe, and Latin America. Students on these exchanges pay regular tuition, room, and board to NC State. Requirements include a GPA of at least 2.750 and at least intermediate level (through 202) language proficiency for programs in which the language of instruction is not English.

NC State Study Abroad Programs are available in Ghana (West Africa), India, and Spain. In addition, Internship/Study programs which combine classroom study with internships for academic credit are available in the Dominican Republic and, through the EPA program, in Spain, France, Germany, Belgium, England, and Australia. Students on these programs pay a set program charge for tuition, housing, and meals. The costs are usually somewhat more than in-state, but less than out-of-state tuition at NC State. Requirements include a GPA of at least 2.750 and for programs in Spain, France, and Germany, completion of at least the 202 level of language study.

NC State Summer Programs are available in more than a dozen locations each summer. NC State programs are directed by NC State faculty and offer NC State course credit and grades. Students on these programs pay a set program fee which generally covers tuition, housing, some meals, and excursions, although the details vary from program to program. Eligibility requirements vary, but many programs are open to students in good academic standing who have completed the freshman year. Students typically earn 6 hours of credit on summer programs. The programs below will be offered in the summer of 1997. For the list of programs for the current year contact Assistant Director, Anne Haberkern in the Study Abroad Office, Box 7344.

**GREAT BARRIER REEF, AUSTRALIA.** This program offers NC State students an opportunity to study tropical field ecology on Australia*s Great Barrier Reef and combines the study of ecological theory with practical research in one of Earth*s richest biological systems. Participants wanting credit may enroll in either an undergraduate course in Agriculture and Life Sciences or a graduate course in Zoology. Study is done at the Heron Island Research Station, a small island at the southern end of the Great Barrier.

**VIENNA, AUSTRIA.** This program offers five courses taught in Vienna during the month of July: the Arts of Vienna, Vienna and Its Relation to East Central Europe and the European Union, Contemporary Science and Human Values (using Vienna as a case study), and two German-language courses. The first three courses are taught in English. Students live in a residence near the city center. The program includes a four-day trip to Prague and Budapest as well as an excursion to the castles and monasteries on the Danube. Most afternoon, evenings and weekends are free to explore one of the world's most beautiful and vibrant cities.

**AUSTRIA/EGYPT.** This program is designed for students in the University Scholars Program and other NC State students with a GPA of 3.000 or better. It is a unique opportunity for comparative study of a central theme, water, in two very diverse cultures. Courses are HSS 398S Scholars Seminar *Water Works in Austria and Egypt* and MDS 351 *Arts: Ideas and Values*. Extensive use of sites, architecture and museums in the two countries are incorporated into the course work.

**COSTA RICA.** This is a five-week program of intensive ethnographic field work focusing on the problems of sustainable ecotourism in Costa Rica, conducted jointly with East Carolina University. Students spend the first week in Costa Rica*s beautiful central highlands studying ethnographic methods and learning about the sociocultural and economic issues surrounding Costa Rica*s tourism industry. The following four weeks are spent primarily in the region near Manuel Antonio National Park. Students stay in Costa Rican family homes in the town of Quepos. Participants must have at least two semesters of Spanish.

**PRAGUE, CZECH REPUBLIC.** Located in Prague, one of Europe*s most beautiful and historic cities, this 6-week program offers credit hours from the School of Design. Courses in landscape architecture, art and design are offered as studios. Study of architecture and urban planning consists of two 3-credit courses. Some weekend trips and a 4-day excursion through southern Bohemia are included. Cultural events include ballet, opera, jazz and marionette theater performances. Courses are taught in English.

**LONDON, ENGLAND.** This program provides American-style university-level classroom instruction in the heart of London. NC State professors teach an arts course focusing on the arts, architecture, music and theater of London and a course on the British perspective on the American Revolution. Students reside and study at Canterbury Hall, a University of London residence hall located in the Bloomsbury section, within walking distance of the British Museum, Charles Dickens House, and the theater district. Included in the program are tickets to theater and concert events and

day excursions. Optional weekend excursions are available to Paris and Edinburgh.

**OXFORD, ENGLAND.** This program offers courses entitled Shakespeare, Art Treasures of Oxford, and Britain since 1930, all taught by British instructors. Students reside and study in St. Benet*s Hall, a permanent private hall of Oxford University. The program offers several day trips including theater performances in London and the Shakespeare Theater at Stratford-on-Avon. A country town and industrial center, Oxford is best known as the seat of Oxford University, England*s oldest university, and is celebrated for tradition, academic excellence and beautiful architecture.

**LILLE, FRANCE.** This 6 week French language and European culture program is held at the renowned language institute CLARIFE, located at the Catholic University of Lille. Lille, known as *the Gateway to Europe*, is the hub of cross-Channel railroad travel which makes this city readily accessible to most major European destinations. Excursions include Paris and the northeastern French coast. This program is open to students at the 200 level in French.

**BARODA, INDIA.** This School of Design program provides upperclassmen and graduate students an opportunity to be immersed in the design, culture, and nature of India. It focuses on the study of issues in landscape architecture, urban design and architecture. Based in Baroda in the state of Gujarat. The program includes excursions to sites including Ahmedabad, Rajasthan, the Taj Mahal and New Delhi.

**GUBBIO,ITALY.**During this 6 week program, design students (including architecture, landscape architecture and graphics students) will have firsthand experience observing and producing works of art in Italy. Students will have opportunities to interact with local artists and artisans in this picturesque hilltown and participate in a studio. Six hours studio credit can be earned.

**CUERNAVACA, MEXICO.** This language and culture immersion program is located 70 miles south of Mexico City in the city of Cuernavaca, called the City of Eternal Spring because of its mild sunny climate. Students live with Mexican families and attend the Center for Bilingual and Multi-cultural Studies. This program includes weekend excursions to pyramids, major archaeological sites, historical cities and a recreational weekend in Acapulco. Students may earn up to six credits of Spanish language credit, including beginning, intermediate and advanced level courses.

**SANTANDER, SPAIN.** This six-week program is available to upper level and graduate students in architecture and landscape architecture, offered jointly with UNC-Charlotte. An intensive studio course focuses on the design of urban spaces. The studio group also has extensive field trips to major Spanish cities and small towns in order to study historical and contemporary examples of architecture, parks, gardens and plazas. Spanish language ability is not required. Students live in the University of Cantabria*s residence halls. The courses are taught by professors and professional designers from North Carolina.

**GHANA, WEST AFRICA.** (Humanities) Offered through the African-American Studies Minor program, this program offers course work and immersion in African culture. Courses include *Ghanaian Culture and Society*,*History, Politics and Economic Development of Ghana*, and *Social and Psychological Health Issues in an African Context*.
Based at the University of Ghana in Legon, the program will also include a number of excursions. Housing is primarily in family home stay.

**GHANA, WEST AFRICA.** (Art and Design) Sponsored by the School of Design, this program offers students an opportunity for intensive studio and research work in African art and design, and exposure to the rich history and traditions of Ghana. Based at the College of Art at the University of Science and Technology in Kumasi. Courses offered in ceramics, painting, sculpture, and textiles.

### Volunteer and Work Programs

In addition to the academic programs listed above, NC State students may participate in a wide variety of volunteer and paid work options around the world. Most programs operate during the summer months, although some programs during the academic year are available.

### International Student Exchange Program

NC State is one of 100 colleges and universities in the United States participating in the International Student Exchange Program. Through ISEP, undergraduate students may attend any of 100 member institutions in Africa, Asia, Australia, Canada, Europe, and Latin America on an exchange student basis for a summer semester or single academic year.

NC State students pay a program fee for their stay abroad which is based on their regular tuition and fees plus the cost of room and board at NC State. Aside from travel expenses and health coverage, ISEP makes it possible for NC State students to study outside the country for the same cost of continuing studies at NC State. This arrangement also allows students to maintain their eligibility for financial aid. While abroad, ISEP students are entitled to all the benefits and services of regular full-time students at their host institutions. Room and board are provided and an ISEP coordinator on each campus is available to students for assistance with any problem.

To apply to participate in ISEP at NC State a student should have a cumulative grade point average of at least 2.750 and have already studied at NC State for two semesters. Applicants must be proficient in the language of instruction at the study sites they choose. A campus selection committee, made up of faculty members, chooses those applicants as NC State's participants. Applicants are not in competition

with each other. The ISEP Selection Committee bases its decision on the feasibility of each applicant's proposed course of study, on academic background, application and references. The selection process for each academic year takes place in the winter of the preceding year. Students begin the application process by requesting a copy of the ISEP Directory from the Study Abroad Office.

# Admissions

The freshman application priority deadline for the fall semester and summer sessions is February 1; the transfer student priority deadline is March 1. Freshmen are encouraged to apply during the fall of the senior year in high school. All applicants for the School of Design must submit applications by December 1. Applications for the spring semester should be submitted prior to November 1. The School of Design does not admit students in the spring.

Each applicant must complete an application form which may be obtained from high school counselors or by writing to:

Director of Admissions
Box 7103
North Carolina State University
Raleigh, North Carolina 27695-7103

A nonrefundable $55 fee must accompany the completed application.

**FRESHMAN ADMISSION**

Admission to the University is competitive, and it is possible to be admissible to some programs but not to all programs at NC State. Applicants are asked to indicate their first and second choices for a curriculum, including undeclared majors within a college, or to indicate their choice of participating in the First Year College. Applications which are not admissible in the first curriculum choice will be reviewed for admissibility in the alternate curriculum choices or the First Year College. Transfer between programs after a successful first year may be possible.

The admissions decision is based primarily on the evaluation of the high school record, including the level and difficulty of the courses taken, the overall grade point average, rank in class, and scores on the Scholastic Aptitude Test (SAT) or the American College Testing Program (ACT). Extra-curricular involvement and

leadership are also considered. These factors are reviewed with the curriculum choice to determine admissibility as a freshman at NC State.

In addition, the Board of Governors of the University of North Carolina System has determined that the minimum undergraduate admissions requirements for all constituent institutions, including NC State, shall be:

- A high school diploma or its equivalent
- English - four course units in English, emphasizing grammar, composition, and literature
- Mathematics - three course units in math, including algebra I, algebra II, and geometry, or a higher level math course for which algebra II is a prerequisite
- Social Studies - two course units in social studies, including one unit in United States history
- Science - three course units in science, including at least one unit in a life or biological science; at least one unit in a physical science (for example, physical science, chemistry, or physics) and at least one laboratory course.

Further, prospective students must complete at least two course units in one foreign language. It is recommended that every student take a foreign language course and a mathematics course in the twelfth grade. *Any additional entrance requirements for admission to NC State will be set forth in the Freshman Admissions Bulletin for that year. Any exceptions to University admissions requirements must be approved by the faculty members of the University Undergraduate Admissions Committee.*

Applicants are accepted on either junior or senior test scores, although senior scores are recommended, especially if the applicant is also applying for financial aid or scholarships. An interview is not required and does not weigh in the admissions decision; a prospective student is always welcome to visit the Admissions Office, 112 Peele Hall. The Admissions Office conducts freshman information sessions every Monday, Wednesday, and Friday at 10:30 a.m. and on Tuesday and Thursday at 1:30 p.m. Campus tours led by students are conducted each weekday, weather permitting, at 12:20 p.m., starting at the Memorial Bell Tower.

**Two-Year Agricultural Institute**

Requirements for admission to the Agricultural Institute, a two-year terminal program, include graduation from an accredited high school or successful completion of the high school equivalency examination administered by the State Department of Public Instruction. The application should include either a copy of the high school record or a letter indicating the applicant has passed the equivalency examination. Each application is reviewed and evaluated by the Institute Director. SAT scores are

not required but are recommended. Course work is not transferable into the four-year degree programs. Completion of the Agricultural Institute leads to an Associate of Applied Science (AAS) degree. (See College of Agriculture and Life Sciences).

**Standardized Test Scores**

Applicants for admission as freshmen must submit scores from the College Board Scholastic Aptitude Test (SAT) or the American College Testing Program (ACT). Students should request that their scores be sent directly from the testing service to NC State. (SAT Code #5496, ACT code #3164) Information booklets and application forms may be obtained from school counselors or by writing directly to the testing services:

SAT address: The College Board ATP
Box 592
Princeton, New Jersey 08541

ACT address: ACT Records Department
P.O. Box 451
Iowa City, Iowa 52243-0451

**SAT II (Achievement Tests)**

Freshman students must present SAT II Mathematics Subject Test scores to ensure proper math placement at NC State. Students in curricula for which the normal *first* mathematics course is calculus should take the Level II test. Students in all other curricula should take the Level I test. Current admissions information and the application contain information about appropriate achievement tests for each curriculum.

**Advanced Placement**

A student may qualify for advanced placement by one or more of the following means: (1) by passing a proficiency examination administered by a teaching department at NC State; (2) by attaining a score of 670 or higher on the verbal portion of the SAT; (3) by meeting a specific minimum score on certain of the CEEB Advanced Placement Program (APP) examinations; and (4) by attaining at least a minimum score (generally 3) on certain of the College Level Examination Program (CLEP) subject tests.

## OUT-OF-STATE STUDENTS

Undergraduate applicants from outside North Carolina may be required to meet more competitive standards for admission than North Carolina residents. NC State is limited to accepting not more than 18 percent of total new undergraduate students from outside the state.

## TRANSFER STUDENTS

NC State welcomes transfer applicants, and in recent years, more than 25 percent of our graduates started their college programs at other institutions. A transfer student should present at least 30 semester hours (or 45 quarter hours) of satisfactory (C or better) college-level work with a minimum overall 2.000 © average on all college work attempted and be eligible to return to each institution previously attended. *Most programs require a higher minimum grade point average for admission.* Individual official transcripts must be submitted from each institution attended. The college credits must have been earned at a regionally accredited institution and must include a college-level math and a college-level English course. Applications of students from non-regionally accredited institutions will be reviewed by the Admissions Committee.

Students who graduated from high school since 1990 must submit a high school record to verify that they have met minimum admissions requirements for course work as outlined in the Freshman Admissions section of this catalog. Exceptions to this requirement are students who will have earned an A.A., A.S. or A.F.A. degree before enrolling at NC State. Individuals who do not have the minimum admissions requirements at the high school level must complete at the college level six semester hours or nine quarter hours each of English, mathematics, science and social science to be eligible to transfer.

Applications from technical institutes, technical colleges, and technical programs at community colleges are evaluated on an individual basis. Credits from such programs are generally not considered for automatic transfer, but qualified students who are otherwise admissible may receive transfer credit by prescribed procedures. These procedures include credit by examination and/or validation by the appropriate subject matter academic unit on the NC State campus.

Once applicants have been accepted, their transcripts are evaluated for credit that is transferable to the University. The college to which application is made will determine the exact amount of credit applicable toward a degree at NC State. A grade of C or better is required before a course may be considered for credit.

*Transcripts are not evaluated until the applicant has been admitted.* International students are carefully screened for evidence of English language proficiency, adequate financial backing and academic credentials indicating potential for success.

## UNCLASSIFIED STUDENTS

Unclassified students are those working for college credit but not enrolled in a degree-granting program. Admission as an unclassified student requires the recommendation of the dean of the school in which the student wishes to enroll. Unclassified students must meet the same entrance requirements as regular degree students and must meet the same academic requirement to continue. If, at a later date, unclassified students wish to change to regular status, their credits will be evaluated in terms of the requirements of their intended curriculum.

## LIFELONG EDUCATION STUDENTS

The Lifelong Education student classification is designed for residents of the Triangle area who have not been formally admitted into a degree program at the University but who wish to enroll in courses offered by the University. Lifelong Education students are limited to a maximum course load of two courses plus one physical education course each semester or summer session.

Lifelong Education student applications should be made through the Office of Adult Credit Programs & Summer Sessions, at the McKimmon Center, corner of Western Boulevard and Gorman Street. If Lifelong Education students wish to become undergraduate degree candidates at a later date, they must make application through the Office of Undergraduate Admissions and are encouraged to make an appointment with that office to discuss entrance requirements. Lifelong Education students wishing to become graduate degree candidates must make application through the Graduate School and should consult the Graduate Administrator in the chosen field of study for advice or clarification of information.

## SERVICEMEN'S OPPORTUNITY COLLEGES

NC State has been designated as a member of the Servicemen's Opportunity Colleges (SOC) General Registry - a network of institutions sponsored by the American Association of State Colleges and Universities and the American Association of Community and Junior Colleges. Servicemen are encouraged to take college level courses offered by accredited institutions and made available to military personnel through SOC. Records are evaluated, files are retained, counseling is provided, and recognition is given for learning through noninstitutional sources when

appropriate. Transcripts must be sent to the Director of Admissions directly from the institution offering the course.

## COLLEGE LEVEL EXAMINATION PROGRAM (CLEP)

A national program administered by the College Board, CLEP is a series of examinations that allows students to show knowledge in a wide range of areas. The tests are used to grant credit for corresponding college courses. There are five General and 30 Subject Examinations. At NC State credit is granted primarily for Subject Examinations, as these provide a more satisfactory evaluation of subject matter covered in NC State courses. Scores and essays, if required, are reviewed and credit granted by the department offering the corresponding course.

Information regarding credit and testing dates and locations can be obtained in the Counseling Center, 2000 Harris Hall, (919) 515-2423.

Both General and Subject Examinations at NC State are administered during the third calendar line of each month except December and February. It is necessary to register for the examinations at least three weeks before the first of the week in which they are to be given. The examinations are administered through the Counseling Center at North Carolina Central University, Durham, North Carolina, (919) 683-6336.

## GRADUATE STUDENTS

Procedures and policies governing graduate admission are outlined in a separate catalog issued by the Graduate School. For a copy of the *Graduate Catalog* write:

Dean of the Graduate School
104 Peele Hall
Box 7102
North Carolina State University
Raleigh, North Carolina 27695-7102

## NEW STUDENT ORIENTATION

New Student Orientation, a component of the Division of Undergraduate Studies, provides assistance to newly admitted first year and transfer undergraduate students. The primary focus is on students' transition to NC State. Twelve (12) Orientation sessions, scheduled during June and prior to each fall and spring semester, coordinate access and interaction of students with both academic and student affairs' resources.

The goal of orientation is to expose students to broad educational opportunities and to begin the process of integrating them into the life of the institution, thus promoting their ability to maximize the benefit of a successful college experience.

For more information, contact:
New Student Orientation
Voice: 919/515-1234, FAX:919/515-5844
Internet: www2.ncsu.edu/undergrad_studies/nso.html
Mail: New Student Orientation, NCSU, Box 7525, Raleigh, NC 27695-7525

**REQUIRED IMMUNIZATION DOCUMENTATION**

North Carolina state law requires all new enrollees in the university system to present proof of immunization prior to completion of registration.

Verified proof of immunization against rubella, measles, tetanus and diphtheria must be presented to the University Student Health Service no later than the first day of classes. Also required is a PPD skin test within 12 months of the first day of classes.

If this requirement is not met, dismissal from school is mandatory under the law. For assistance, contact the Student Health Service, (919) 515-7233.

# Registration

Registration is conducted by using the Telephonic Registration Access to Computerized Scheduling (TRACS) system. This system allows students to use any touch-tone telephone to register for classes. A *Schedule of Courses* is available for every semester prior to the beginning of the registration period. This contains all necessary instructions for completing registration.

Registration consists of three steps: (1) meeting with advisers to determine course requirements and to obtain a Personal Identification Number (PIN); (2) registering for courses using the TRACS system; and (3) paying tuition and fees and all other debts to the University by the established deadlines. Instructions for completing registration are issued each semester and summer session.

For more information, contact the Department of Registration and Records, 1000 Harris Hall, (919) 515-2572.

### INTERINSTITUTIONAL REGISTRATION

A regularly enrolled undergraduate degree student who is enrolled in at least eight credit hours at NC State may take, under certain conditions, course work at one of the Raleigh colleges, at the University of North Carolina at Chapel Hill, at the University of North Carolina at Greensboro, at Duke University, or at North Carolina Central University. Interinstitutional registration forms and all registration procedures are available from the Department of Registration and Records.

### SCHEDULE CHANGES - DROPS AND ADDS

Courses may be added during the first two weeks of a regular semester. All courses may be dropped without regard to course load during the first two weeks of a regular semester. During the third and fourth weeks of a semester, full-time undergraduate students who wish to drop courses at any level and whose academic load would thereby fall below the twelve-hour minimum course load may do so only for documented medical reasons or other verified, unforeseen grounds of personal or family hardship.

For undergraduate students, exceptions to the drop policies require the recommendation of a student's adviser (or the departmental coordinator of advising or the department head) and approval by the student's dean. Students who wish to drop all courses for which they are enrolled, must withdraw from the University for the remainder of the semester or summer term in which they are enrolled. A degree student who finds it necessary to drop all courses will initiate withdrawal from the University at the Counseling Center, 2000 Harris Hall.

# Tuition and Fees

**North Carolina Resident** - $1100.00 per semester (effective 1996-97 academic year)

**Nonresident** - $5,366.00 per semester (effective 1996-97 academic year)

A statement of tuition and fees is mailed to each preregistered student before the beginning of any term. The statement must be returned with full payment or complete verifiable financial aid information by the due date appearing on the statement. Normally, the due date is two weeks before classes begin. Non-preregistered students are required to pay their tuition and fees plus late fees during late registration. Fees

are the same for both residents and nonresidents and are required of all students. Nonresident students are required to pay an additional $4,266 per semester for tuition.

## ESTIMATED ANNUAL UNDERGRADUATE EXPENSES

| *Tuition and Fees* | *First Semester* | *Second Semester* | *Year* |
|---|---|---|---|
| (a) N.C. Residents | $ 1,100 | $ 1,100 | $ 2,200 |
| (b) Out-of-State Residents | 5,366 | 5,366 | 10,732 |
| Room Rent | 925 | 925 | 1,850 |
| Meals | 960 | 960 | 1,920 |
| Books and Supplies | 300 | 300 | 600 |
| Other personal expenses | 525 | 525 | 1,050 |
| *Total* | | | |
| (a) N.C. Residents | $ 3.810 | $ 3,810 | $ 7,620 |
| (b) Out-of-State Residents | $ 8,076 | $ 8,076 | $ 16,152 |

NOTE: *All charges are subject to change.*

## EXPENSES OTHER THAN TUITION AND GENERAL FEES

*Application Fee*: A non-refundable fee of $55 must accompany each application for admission.

*Room Rent*: New incoming students receive room reservation instructions in the letter of acceptance. Continuing students are provided a card with instructions at their residence hall rooms. The 1996-97 charge for room rent ranged from $925 per semester for most residence halls to $1210 for North Hall, Wood Hall, and Watauga Hall.

*Meals*: During their first academic year, new freshmen electing to reside on campus are required to participate in one of the University's available meal plans. Meal plan costs in 1996-97 range from $740 to $1,200. Other students pay for meals individually at the various dining facilities available both on and near the campus.

*Books and Supplies*: Books and supplies are usually purchased during the first week of classes directly from the Students Supply Stores. Allow approximately $300 per semester for purchasing books and supplies.

*Personal Expenses*: Personal expenses vary widely among students but the estimate of $525 is based on what students report that they spend on these items.

*Administrative Management Fee*: A special administrative management fee of $250 per semester and $150 per summer session is required from a contracting agency sponsoring international students whose programs are coordinated through the University's Office of International Visitors.

*Cooperative Education Program Fee*: Required of all participating co-op students for each semester in which they are enrolled in an off-campus work assignment. This fee, set at $316 for the 1996 fall semester, the 1996 spring semester, or the combined 1997 summer sessions, is used for partial support of the Cooperative Education Program staff in job development and placement activities. Students paying this fee are entitled to all University services, facilities, and programs during the semester or combined summer sessions for which they are enrolled.

*College of Engineering Computing Fee*: All students enrolled in the College of Engineering, both graduate and undergraduate, will be billed a $45 per semester fee to support the Engineering Computing Facility. Payment of the fee will provide students with access to standalone workstations which comprise the Engineering Computing Facility.

Students who enroll in a co-op work session will not be billed for the Computing Fee unless they also enroll in NC State courses.

## REQUIRED FEES

Required fees are levied for services, facilities, and programs available to all students whether or not the student takes advantage of them. Students are assessed fees based on the course load they are taking. An itemization of required fees and other detailed information concerning expenses or related data can be obtained by contacting the University Cashier's Office, NC State, Box 7213, Raleigh, North Carolina 27695-7213, (919) 515-2986.

## REFUND POLICY

Refunds for official withdrawals from NC State University are prorated based upon the percentage of the enrollment period attended. No refunds are made for official withdrawals after 50 percent of the enrollment period. The prorated withdrawal schedule for each semester is publicized through university media after it is established. In some instances, circumstances justify the waiving of rules regarding refunds. An example might be withdrawal because of sickness. Students have the privilege of appeal to the Fee Appeals Committee when they believe special consideration is merited. Applications for such appeals may be obtained from the University Cashier's Office, 1101 Pullen Hall.

## RESIDENCE STATUS FOR TUITION PURPOSES

The basis for determining the appropriate tuition charge rests upon whether a student is a resident or a nonresident for tuition purposes. Each student must make a statement as to the length of his or her residence in North Carolina, with assessment by the institution of that statement to be conditioned by the following.

**Residence.** To qualify as a resident for tuition purposes, a person must become a legal resident and remain a legal resident for at least twelve months immediately prior to classification. Thus, there is a distinction between legal residence and residence for tuition purposes. Furthermore, twelve months legal residence means more than simple abode in North Carolina. In particular, it means maintaining a domicile (permanent home of indefinite duration) as opposed to "maintaining a mere temporary residence or abode incident to enrollment in an institution of higher education." The burden of establishing facts which justify classification of a student as a resident entitled to in-state tuition rates is on the applicant for such classification, who must show his or her entitlement by the preponderance (the greater part) of the residentiary information.

**Initiative.** Being classified a resident for tuition purposes is contingent on the student's seeking such status and providing all information that the institution may require in making the determination.

**Parents' Domicile.** If an individual, irrespective of age, has living parent(s) or court-appointed guardian of the person, the domicile of such parent(s) or guardian is, prima facie, the domicile of the individual; but this prima facie evidence of the individual's domicile may or may not be sustained by other information. Further, nondomiciliary status of parents is not deemed prima facie evidence of the applicant child's status if the applicant has lived (though not necessarily legally resided) in North Carolina for the five years preceding enrollment or re-registration.

**Effect of Marriage.** Marriage alone does not prevent a person from becoming or continuing to be a resident for tuition purposes, nor does marriage in any circumstance insure that a person will become or continue to be a resident for tuition purposes. Marriage and the legal residence of one's spouse are, however, relevant information in determining residentiary intent. Furthermore, if both a husband and his wife are legal residents of North Carolina and if one of them has been a legal resident longer than the other, then the longer duration may be claimed by either spouse in meeting the twelve month requirement for in-state tuition status.

**Military Personnel.** A North Carolinian who serves outside the State in the armed forces does not lose North Carolina domicile simply by reason of such service, and students from the military may prove retention or establishment of residence by reference, as in other cases, to residentiary acts accompanied by residentiary intent.

In addition, a separate North Carolina statute affords tuition rate benefits to certain military personnel and their dependents even though not qualifying for the in-state tuition rate by reason of twelve months legal residence in North Carolina. Members of the armed services, while stationed in and concurrently living in North Carolina, may be charged a tuition rate lower than the out-of-state tuition rate to the extent that the total of entitlements for application tuition costs available from the federal government, plus certain amounts based under a statutory formula upon the in-state tuition rate, is a sum less than the out-of-state tuition rate for the pertinent enrollment. A dependent relative of a service member stationed in North Carolina is eligible to be charged the in-state tuition rate while the dependent relative is living in North Carolina with the service member and if the dependent relative has met any requirement of the Selective Service System applicable to the dependent relative. These tuition benefits may be enjoyed only if the applicable requirements for admission have been met; these benefits alone do not provide the basis for receiving those derivative benefits under the provisions of the residence classification statute reviewed elsewhere in this summary.

**Grace Period.** If a person (1) has been a bona fide legal resident, (2) has consequently been classified a resident for tuition purposes, and (3) has subsequently lost North Carolina legal residence while enrolled at a public institution of higher education, that person may continue to enjoy the in-state tuition rate for a grace period of twelve months measured from the date on which North Carolina legal residence was lost. If the twelve months ends during an academic term for which the person is enrolled at a State institution of higher education, the grace period extends, in addition, to the end of that term. The fact of marriage to one who continues domiciled outside North Carolina does not by itself cause loss of legal residence marking the beginning of the grace period.

**Minors.** Minors (persons under 18 years of age) usually have the domicile of their parents, but certain special cases are recognized by the residence classification statute in determining residence for tuition purposes.

(A) If a minor's parents live apart, the minor's domicile is deemed to be North Carolina for the time period(s) that either parent, as a North Carolina legal resident, may claim and does claim the minor as a tax dependent, even if other law or judicial act assigns the minor's domicile outside North Carolina. A minor thus deemed to be

a legal resident will not, upon achieving majority before enrolling at an institution of higher education, lose North Carolina legal residence if that person (1) upon becoming an adult "acts, to the extent that the person's degree of actual emancipation permits, in a manner consistent with bonafide legal residence in North Carolina" and (2) "begins enrollment at an institution of higher education not later than the fall academic term following completion of education prerequisite to admission at such institution."

(B) If a minor has lived for five or more consecutive years with relatives (other than parents) who are domiciled in North Carolina and if the relatives have functioned during this time as if they were personal guardians, the minor will be deemed a resident for tuition purposes for an enrolled term commencing immediately after at least five years in which these circumstances have existed. If under this consideration a minor is deemed to be a resident for tuition purposes immediately prior to his or her eighteenth birthday, that person on achieving majority will be deemed a legal resident of North Carolina of at least twelve months duration. This provision acts to confer in-state tuition status even in the face of other provisions of law to the contrary; however, a person deemed a resident of twelve months duration pursuant to this provision continues to be a legal resident of the State only so long as he or she does not abandon North Carolina domicile.

**Lost but Regained Domicile**. If a student ceases enrollment at or graduates from an institution of higher education while classified a resident for tuition purposes and then both abandons and reacquires North Carolina domicile within a 12-month period, that person, if he or she continues to maintain the reacquired domicile into re-enrollment at an institution of higher education, may re-enroll at the in-state tuition rate without having to meet the usual 12-month durational requirement. However, any one person may receive the benefit of this provision only once.

**Change of Status**. A student admitted to initial enrollment in an institution (or permitted to re-enroll following an absence from the institutional program which involved a formal withdrawal from enrollment) must be classified by the admitting institution either as a resident or as a nonresident for tuition purposes prior to actual enrollment. A residence status classification once assigned (and finalized pursuant to any appeal properly taken) may be changed thereafter (with corresponding change in billing rates) only at intervals corresponding with the established primary divisions of the academic year.

**Transfer Students**. When a student transfers from one North Carolina public institution of higher education to another, he or she is treated as a new student by the institution to which he or she is transferring and must be assigned an initial residence status classification for tuition purposes.

*Note: General Statute (G.S.) 116-143.1 is the prevailing statute governing residence status classification. Copies of the applicable law and of the implementing regulations are available for inspection in the Office of Undergraduate Admissions, 112 Peele Hall. This information is subject to change.*

# Financial Aid

To be considered for assistance by the Office of Financial Aid, a student and his or her parents must complete the federal government's *Free Application for Federal Student Aid* (FAFSA) and submit this application to the designated processing center for evaluation of the family's ability to pay for educational expenses. This form, referred to as a "need analysis" form, is available from both high school guidance counselors and from the NC State Office of Financial Aid. The FAFSA should be completed preferably by March 1 of the year prior to fall semester enrollment. By completing this form, all undergraduates will be given consideration for the Federal Pell Grant and other forms of federal financial assistance, as well as most types of state and institutional financial aid (except for departmental and merit awards). Students should check with the Office of Financial Aid regarding any other information which may be needed for aid consideration.

Awards are made to applicants on the basis of financial need, satisfactory academic progress, and timely submission of the FAFSA. Determination of a student's need is based on estimated educational costs and a consideration of the family's financial strength, which primarily includes consideration of the family's income, including the student's income, size of family, number of children in post-secondary institutions, family assets (except for home, farm, and business) and other resources that may be available for use such as veterans' benefits, Vocational Rehabilitation assistance, etc.

Aid is available on a non-discriminatory basis to all qualifying students. These awards are usually offered in financial aid "packages" which consist of a combination of gift aid (scholarships and grants), loan, and/or work-study award, depending upon

degree of need. Continuing students must have a satisfactory record of academic progress in order to renew their aid. The Policy on Satisfactory Academic Progress for Financial Aid Eligibility is available in the Financial Aid Office. A new or renewal FAFSA must be submitted each year for continued consideration for assistance.

## NEED-BASED SCHOLARSHIPS FOR FRESHMEN AND CONTINUING STUDENTS

There are a large number of special scholarships which are based upon both demonstrated financial need and academic achievement. These scholarships are administered by the University's Office of Financial Aid as well as by various academic departments on campus. Some of these scholarships have curricular, geographic and other restrictions. Filing the FAFSA by early March will assure the student is considered for all need-based scholarships for which he/she is eligible. Some colleges require separate scholarship applications to be departmental scholarships.

## GRANTS

**Federal Pell Grants** - All applicants for financial aid who have never received a bachelor's degree are considered for this program. Eligibility for a Pell Grant is determined by the federal government, based on the information provided on the FAFSA.

**Federal Supplemental Educational Opportunity Grants** - These grants are made from federal funds to undergraduate students from low-income families. They are especially useful in assisting very needy students who apply for assistance and are generally only available to students who are also eligible for a Federal Pell Grant. These grants are determined by the University's Office of Financial Aid.

**Minority Presence Grant Program - General Program** - The University will continue to fund the Minority Presence Grant Program - General Program, Part I and Part II. The University will allocate this money to historically white and historically black institutions to aid them in recruiting financially needy North Carolina students who would be minority presence students at the respective institutions by enabling the institutions to offer relatively more aid for minority presence students in the form of grants rather than loans. General Program Part I includes funds for minority presence grants for students attending the North Carolina Central University School of Law. General Program Part II consists of grant funds for Native Americans, Hispanics, and Asians.

African American, Native American, Hispanic and Asian American students may be eligible for special assistance under the above programs if they are residents of North Carolina, enrolled for at least three hours of degree credit course work and demonstrate financial need as determined by FAFSA. Recipients are chosen by the University's Office of Financial Aid.

**Minority Presence Grant Program for Doctoral Study, Law and Veterinary Medicine-** This program provides stipends of up to $4,000 for the academic year, with an option of $500 in additional support for study in the summer session, for black residents of North Carolina who are selected to participate. Recipients must be full-time students pursuing doctoral degrees, law degrees, or degrees in vererinary medicine at East Carolina University, North Carolina State University, the University of North Carolina at Chapel Hill, the University of North Carolina at Greensboro, or the University of North Carolina at Charlotte.

**The N.C. Student Incentive Grant** - This program provides grants to legal residents of North Carolina with substantial need. Grants range up to $1,500 per academic year. Since funds are extremely limited, generally only early applicants are awarded these grants. These funds are awarded by the College Foundation, Inc.

## ATHLETIC GRANTS-IN-AID

Athletic awards are made by the Department of Athletics to students who meet the established qualifications for such awards. These awards are based upon athletic ability rather than upon need.

## LOANS

**Federal Perkins Loans (formerly National Direct Student Loans)** Undergraduate students carrying at least half-time academic loads may be awarded these long-term, low-interest loans. These loans are need-based. Six months after ceasing to be enrolled at least half-time, a student must begin paying interest on his or her loan at 5 percent per year as well as assuming a $40 per month minimum repayment obligation. In order to establish a repayment schedule, borrowers are expected to have exit interviews at the Student Loan Section just prior to graduation or other termination of studies.

**Institutional Loans** - A limited amount of other long-term loan money is available in several funds, and these loans are on essentially the same liberal terms as the Perkins Loans.

**Federal Family Education Loans.**

*Federal Stafford Loan Program:* These low interest, deferred payment funds are federal need-based assistance. The interest rate is variable but will not exceed 8.25 percent. Application for this program begins with the FAFSA. A loan authorization form must also be completed by the student designating the student's chosen lender..

*Federal Unsubsidized Stafford Loan Program:* These loans are not need-based, but students must complete the FAFSA before being considered for funds from this source so that the institution can ascertain that all other federal eligibility requirements have been met. As with the need-based Stafford, an additional loan authorization must be completed by the student borrower to be considered for these loans. The student will be charged interest while enrolled on the amount borrowed, but may choose to pay the accrued interest quarterly while enrolled or capitalize the interest for repayment upon graduation. The interest rate is variable but will not exceed 8.25 percent.

*Federal Parent Loan for Undergraduate Students (FPLUS)*: Parents of dependent undergraduate students may borrow through this program an amount to meet educational costs not covered by other financial assistance. These loans are not need-based. Payment options, along with interest rates, will vary but will not exceed 9 percent. Applications for these loans require college certification and are then submitted to the individual lenders.

**Emergency Short-Term Loans** - These loans are available in small amounts (usually not exceeding $100) to enable any full-time enrolled student with a previous good repayment record to meet unexpected expenses. These loans are usually to be repaid within 30 days and are not extended beyond the end of a term or graduation.

## FEDERAL COLLEGE WORK-STUDY PROGRAM

The Federal College Work-Study Program provides jobs on campus for students who qualify with need, based on filing the FAFSA, in the same manner as is required for scholarship or long-term loan assistance. Though individual pay rates vary with the job, basic hourly pay rates comply with the current minimum wage requirements.

## STUDENT EMPLOYMENT SERVICE

The Office of Financial Aid coordinates an employment service to assist students with information about the possibilities of part-time or summer work. No particular academic or economic qualifications are required to obtain jobs on or off campus outside the Federal College Work-Study Program. A current listing of job openings

is maintained at the Office of Financial Aid and under student employment on NC State's home page.

*A brochure which gives a detailed explanation of the need-based aid application and award process and the types of aid available may be obtained upon request from the Office of Financial Aid, 2005 Harris Hall.*

# Housing for Students

## RESIDENCE HALLS

The University operates twenty residence halls across campus for almost 7,000 residents. A variety of residential options are available to accommodate diverse student interests and needs. Twenty residence halls are located across campus, offering single gender and co-ed options in buildings ranging in age from Watauga Hall (1906) to Wood Hall (1983). Each hall is different, with amenities such as computer rooms, laundry rooms, kitchens, and air conditioning available. The professional and student staff members recognize the needs of the residence hall population and strive to provide a challenging yet supportive atmosphere fostering academic success, as well as individual and interpersonal growth.

To be eligible to live in the residence halls during the fall and spring semesters, undergraduate students must be enrolled in at least nine credit hours, while graduate students must maintain at least six credit hours. Students who need to enroll in fewer hours, or who must drop below these minimum requirements during the semester, should contact the University Housing office to request that an exception be made. In certain cases, students may be required to submit a letter of support from their advisor. During the summer sessions, university housing is provided for any enrolled student as space permits.

For more information about campus residence halls, contact University Housing, 1112 Pullen Hall, Box 7315, NC State, Raleigh, NC 27695, or call (919) 515-2440.

## EDWARD S. KING VILLAGE

The University owns and operates 295 apartments (efficiency, one-bedroom, and two-bedroom units). Eligibility to live in the Edward S. King Village is contingent upon being a full-time student at NC State and one of the following: married and living with a spouse and/or children; a single parent living with a child or children for

the duration of occupancy; graduate student; married student unaccompanied by spouse or children; or nontraditional undergraduate student.

E. S. King Village staff and the Village Council implement programs and activities for students, spouses, and children. Recreational areas, playground equipment, and other facilities have been enhanced recently to support the family community atmosphere.

Note: Due to the attractiveness of E. S. King Village, there is usually a waiting list for applicants.

## OFF-CAMPUS HOUSING

The University Housing maintains self-help listings of off-campus apartments, rooms, and houses for rent. These listings are not published, but are available in the University Housing Office, 1112 Pullen Hall, during the hours of 8:00 a.m. - 5:00 p.m., Monday through Friday.

The University has no mobile home parking areas, but privately owned mobile home parks are located within a reasonable driving distance of the campus.

## FRATERNITIES AND SORORITIES

Twenty-one of the 25 general college fraternities, and six of the ten general college sororities chartered at the University maintain chapter houses. Thirteen of the fraternities, and two of the sororities are housed on Fraternity Court, a University-owned project. The remaining fraternities and sororities are located through the immediate community.

Rental fees vary in fraternity and sorority houses depending on the individual chapter, but are approximately the same as the residence hall rates.

# Academic Policies and Procedures

## ACADEMIC ADVISING

Every regularly enrolled student is assigned for academic advising to a faculty member who is normally a member of the department which is, or is most likely to become, the student's major department.

### Responsibilities of the Student

Students have the primary responsibility for planning their individual programs and meeting graduation requirements. This involves: (1) keeping up-to-date with university, college, and departmental curricular requirements through materials available from the faculty advisers or departmental coordinators of advising; (2) keeping informed of academic deadlines and changes in academic policies; and (3) consulting with the faculty adviser or departmental coordinator of advising during each registration period, following notification of academic warning status, and at other times as needed and required by academic policy; and (4) diligent in attending class and meeting class objectives and assignments.

### Responsibilities of the Faculty Adviser

Although students have the primary responsibility for planning their programs, faculty advisers are expected to: (1) be available for conferences at appropriate times and places about which their advisees have been informed; (2) provide accurate information about academic regulations and procedures, course prerequisites, and graduation requirements; (3) assist students in planning academic programs suited to their interests and abilities and their career objectives; (4) discuss with their advisees appropriate course choices in fulfilling curriculum requirements as well as possible consequences of various alternative course choices: (5) inform their advisees when the advisee's proposed course selections conflict with University academic or curricular regulations; (6) assist advisees with following proper procedures for such things as exceptions to the course drop deadlines, auditing a course before or after taking it for credit, taking a course under the credit by examination policy, registering for 19 or more credit hours, registering for Cooperating Raleigh Colleges (CRC) interinstitutional courses, or repeating a course previously passed; (7) refer their advisees for special testing or counseling as needed; and (8) assist their advisees in considering the appropriateness of academic adjustments where these become necessary in cases of serious injury or illness.

**Responsibilities of the Coordinator of Advising and Teaching**

Each college or department has a coordinator of advising and teaching who is responsible for: (l) assigning, training, and supervising faculty advisers; (2) providing up-to-date, printed course and curriculum information for advisers and students; (3) reassigning to another adviser any student who so requests; and (4) assisting any student who wants to major in the coordinator's area of study but is ineligible at the time to transfer into it. Students in this category keep their adviser in the department in which they are enrolled but consult additionally with the coordinator of advising and teaching for the department offering the curriculum in which they wish to enroll. Whenever appropriate, the coordinator will advise students that they should consider alternative curricula.

## LENGTH OF TIME TO GRADUATION

The normal and expected length of time to graduation is four years (eight semesters) which requires a student to complete an average of 16 credit hours each semester (for most curricula), or to attend one or more summer sessions.

*By action of the N.C. General Assembly, effective with the 1994 fall semester, new students entering any of the sixteen campuses of The University of North Carolina system (including NC State), will be assessed a 25 percent tuition surcharge once they have attempted more than 140 degree credit hours. (Degree programs at NC State require 128 hours or less for graduation.) Courses taken in summer school at any UNC-System campus do not count toward the 140 hour limitation. Question about this new policy should be directed to the Department of Registration and Records, 515-2572.*

In order to make continuous progress toward graduation, students should be encouraged to take full advantage of the university's advising and support services. Effective career decision-making and early, deliberate, long-range, semester-by-semester planning of courses and careful selection of extra-curricular commitments can provide direction and motivation necessary for effective use of time to graduation. Additional factors that may assure a student's continuous progress toward graduation include (1) good academic performance in freshman and basic prerequisite courses, (2) advanced placement credit for introductory courses, and (3) enrollment in summer sessions.

Students should be discouraged from taking unrealistically large loads which may result in poor academic performance. They are, however, encouraged to maintain the highest course load possible.

Students may take more than eight semesters to complete an undergraduate program at NC State. In some cases this is the result of effective decision-making on the part of the student for such things as (1) participation in cooperative education or study abroad programs, (2) a decision to be a part-time student with a reduced course load for reasons of health, necessary outside employment, or parental responsibilities, or (3) attempting dual degrees, double majors, or minors. In other cases the length of time to graduation may be prolonged beyond the eighth semester as a result of (1) incomplete or inadequate secondary school background requiring some additional compensatory, developmental, or prerequisite courses, (2) poor academic performance in the freshman year or early semesters, or (3) late changes of curriculum.

## CLASSIFICATION OF STUDENTS

Undergraduate degree students are classified according to the number of completed credit hours. The required number of hours of each classification is:

| *Classification* | *Semester Hours of Earned Credit* |
|---|---|
| Freshman (FR) | Fewer than 30 |
| Sophomore (SO) | 30 or more, but fewer than 60 |
| Junior (JR) | 60 or more, but fewer than 92 |
| Senior (SR) | 92 or more |

Students classified under the preceding system as SO(or 02) as of the start of Fall 1995 will retain that classification, regardless of whether they have attained 30 hours as of the start of the Fall 1995.

**Agricultural Institute** students are designated as first (01) year if they have earned fewer than 30 semester credits and second (02) year if they have earned 30 or more semester credits.

**Unclassified Students (UN)** are those working for college credit but not enrolled in a degree-granting program. Admission as an unclassified student requires the recommendation of the dean of the school in which the student wishes to enroll. Unclassified students must meet the same entrance requirements as regular degree students and must meet the same academic requirements to continue. If, at a later date, unclassified students wish to change to regular degree status, their credits will be evaluated in terms of the requirements of their intended curriculum.

The **Special Student (SP)** classification includes Undergraduate Studies and Post-Baccalaureate Studies students:

(1) **Undergraduate Studies (UGS)** students are United States citizens who have not obtained a baccalaureate degree and who take courses but who are not currently admitted to a degree program. To be eligible to register as a UGS student, a person should either: (a) have acquired a high school diploma or a GED certificate; not have been suspended from any college or university (including NC State) within the last three years; and not be a degree candidate at NC State; or (b) be a high school student who has been recommended by his/her school and approved by the Undergraduate Admissions Office to take lower level courses. Visiting summer sessions students and visiting interinstitutional students do not necessarily have to meet the above criteria.

(2) **Post-Baccalaureate Studies (PBS)** students are United States citizens who take courses beyond the baccalaureate degree but who are not currently admitted to a degree program. This classification is closed to international students with the following exceptions: (a) spouses of regularly enrolled NC State degree students; or (b) students enrolled in special programs such as AID or FAO who are approved in advance by the International Student Office and the Graduate School.

All **UGS** and **PBS** students must register through the Office of Adult Credit Programs and Summer Sessions which is located in the Jane S. McKimmon Center for Extension and Continuing Education. *Persons found eligible to study as UGS or PBS students are not to assume that they have received formal admission to the University as either undergraduate or graduate degree candidates.* To become a degree candidate, formal application must be made through the Undergraduate Admissions Office or the Graduate School.

The maximum course load for all UGS and PBS students is two courses plus one physical education course each semester or summer session. They may enroll in any course offered by the University, provided they have satisfied any required prerequisites and space is available. The academic standards applicable to undergraduate degree candidates at the University, including the Continuation of Undergraduate Enrollment Policy, apply to UGS and PBS students.

## COURSE LOAD

The maximum course load for undergraduate degree students is 21 credit hours a semester and two courses plus a physical education course in a summer session. To carry more than the maximum, students must obtain the approval of their academic adviser and of their college dean. Undergraduate students who propose to register for 19 or more credit hours a semester must obtain approval from their academic adviser. First semester freshmen with admissions indices less than 2.000 and continuing students with a grade point average less than 2.000 should be advised to carry no more than 16 credit hours in a semester.

For Undergraduate Studies (UGS) and Post-Baccalaureate Studies (PBS) students the maximum course load is two courses plus a physical education course in a regular semester or summer session. Exceptions must be approved by the Admissions Office for UGS students and by the Registrar for PBS students..

The minimum course load for full-time undergraduate degree students is 12 credit hours, except in their final semester when a lesser number may be taken if that is all the student needs to fulfill the requirements for a degree. In order to receive financial aid a student must meet the minimum course load requirements of the appropriate funding agency.

*The number of hours for which a student is officially enrolled is that number in which the student is enrolled for credit at the end of the second week of classes (i.e., the last day to withdraw or drop a course with a refund).*

## REGULAR GRADING SCALE AND GRADE POINTS

| *Grade* | *Definition* | *Grade Points Per Credit Hour* |
|---|---|---|
| A+ | | 4.000 |
| A | Excellent | 4.000 |
| A- | | 3.670 |
| B+ | | 3.330 |
| B | Good | 3.000 |
| B- | | 2.670 |
| C+ | | 2.330 |
| C | Satisfactory ("Passing" for graduate students) | 2.000 |
| C- | | 1.670 |
| D+ | | 1.330 |
| D | Marginal | 1.000 |
| D- | | 0.670 |
| F | Failing | 0.000 |

*A grade of C- satisfies a "grade of C or better" prerequisite and other "C-Wall" requirements.*

*Students classified under the preceding system as SO (or 02) as of the start of Fall 1995 will retain that classification, regardless of whether they have attained 30 hours as of the start of Fall 1995.*

**Grading Guidelines**

Instructors are expected to inform students, as a part of the course syllabus distributed at the beginning of the semester, as to whether the +/- scale or the unmodified (A,B,C,D,F) scale will be used.

Students enrolled in each section of a multiple section course in which the material, the sequencing of its treatment, and the examination are common to all sections should be graded on the same scale.

**Exemption**

Any student registered in a degree program during a regular semester prior to 1994 Fall Semester will not be subject to the grade point values associated with plus/minus grading as long as the student remains in the same degree level. (There are five degree levels: undergraduate, graduate, professional, Agricultural Institute, and Veterinary Medicine.) Thus, when the teacher of a course chooses to award +/- grades, any +/- grades received by such a student will appear on that student's grade report and transcript, but the grade points used in calculating the students GPA will not reflect the +/- differentials. (Teachers are expected to inform students as a part of their syllabus or outline at the beginning of the course of the grading scale to be used.) This adjustment will be made only for students registered in a degree program. Students who are registered as non-degree students prior to the fall/summer 1994 will be subject to the full grade point range along with students who enroll as a degree student in the fall 1994 semester and thereafter. An exception will be made for students enrolled as Undergraduate Studies (UGS) students who had been enrolled in and subsequently suspended from an undergraduate degree program. These students will be treated as undergraduate degree students for the purposes of this policy.

A student who is not subject to grade point values associated with +/- grading will continue to be so until the student enrolls in a different degree level. For example, a student who is not subject to grade point values associated with +/- grading as an undergraduate student will be subject to grade point values associated with +/- grading upon enrollment in a graduate program. Once the student is subject to grade point values associated with +/- grading, the grade point values associated with +/-

grading in all future terms even if the student returns to the student's original degree level.

Whether or not a student is subject to the grade point values associated with +/- grading will not be affected by length of time enrolled or by breaks in enrollment. Students pursuing additional degrees in the same academic level will maintain their exemption status.

The exemption stated in #3 will end with the 1998 Fall Semester when grade point values associated with +/- grading will be in effect for all students regardless of their initial enrollment date.

*The following grades are not used in the calculation of grade point averages.*

| | |
|---|---|
| S | Satisfactory (Credit-only and certain other courses) |
| U | Unsatisfactory (Credit-only and certain other courses) |
| CR | Credit by Examination or Advanced Placement |
| IN | Incomplete |
| LA | Temporarily Late |
| AU | Audit |
| NR | No Recognition Given for Audit |
| W | Withdrawal or Late Drop |

**Description of Letter Grades**

**D-Marginal**. This grade is used to recognize that a student's performance was marginal but clearly better than that of students who receive an F.

**F-Failing**. This grade is used to indicate that the student has failed the course.

**S-Satisfactory.** This grade is used as a passing grade to be awarded only when the quality of the student's work is judged to be C- or higher level. It is used as the passing grade for students who are taking free elective courses under the credit-only option. It may also be used for certain courses such as orientation courses, seminars, and research problems, in which regular grades are not appropriate.

**U-Unsatisfactory.** This grade is used to indicate that the student is not to receive credit for a credit-only or other course for which the passing grade would be S (*Satisfactory*).

**CR-Credit**. This grade is used by the registrar to indicate course credit received by examination or advanced placement as certified by appropriate departments or colleges. This grade shall be awarded only when the advanced placement testing indicates that the quality of the student's work in the course would have been expected to be of C- or higher level.

**IN-Incomplete**. This grade is used as a temporary grade. At the discretion of the instructor, students may be given an IN grade for work not completed because of a serious interruption in their work not caused by their own negligence. *An IN must not be used, however, as a substitute for an F when the student's performance in the course is deserving of an F. An IN is only appropriate when the student's record in the course is such that the successful completion of particular assignments, projects, or tests missed as a result of a documented serious event would enable that student to pass the course. Work undertaken to make up the IN grade should be limited to the completion of the missed work.*

An IN grade must be made up by the end of the next regular semester (not including summer sessions) in which the student is enrolled, provided that this period is not longer than twelve months from the end of the semester or summer session in which the work was due. In the event that the instructor or department offering the course is not able to provide a student with the opportunity to make up the incomplete work by the end of the next regular semester in which the student is enrolled or within twelve months, whichever is shorter, the instructor or department offering the course must notify the student and the Department of Registration and Records of the date of the extended deadline for removing the IN grade.

Any IN grade not removed by the end of the next regular semester in which the student is enrolled or by the end of twelve months, whichever is shorter, or by the extended deadline authorized by the instructor or department offering the course and recorded by the Department of Registration and Records will automatically become a Failing (F) grade and will count as a course attempted.

Students must not register again for any courses in which they have IN grades; such registration does not remove IN grades, and the completion of the course on the second occasion will automatically result in an F for the incomplete course.

When a *graduating senior* receives an IN, the following procedures apply: (1) if the course *is needed* for graduation, the student will not be allowed to graduate until the work has been made up, and (2) if the course *is not needed* for graduation, the college dean must notify, in writing, the Department of Registration and Records either (a) that the course and the IN grade are to be deleted from the student's record; or (b) that

permission has been given for the IN to remain and that a deadline has been established for the completion of the course. In the event that the course is subsequently not completed satisfactorily, the college dean shall notify, in writing, the Department of Registration and Records that the course and the IN grade should be deleted from the student's record or that the IN should be changed to F.

**LA-Temporarily Late.** This is an emergency symbol to be used only when grades cannot be reported on time by the teaching department or the professor. The LA differs from the IN grade in that the student receiving the LA has completed the work of the course including the examination.

**AU-Audit.** This grade is used in recognition of successful completion of a course audit.

**NR-No Recognition Given for Audit.** This grade is used for unsuccessful completion of a course audit.

**W-Withdrawal or Late Drop.** This grade is used on students' grade reports and transcripts to indicate all courses for which they have received official approval to drop or from which they have received official approval to withdraw after the deadlines for dropping.

## GRADE POINT AVERAGE

The number of credit hours attempted in a semester or summer session (for which grades of A, B, C, D (including plus/minus), or F are received) is divided into the total number of grade points earned to arrive at the Grade Point Average (GPA). The Grade Point Average will be calculated to three decimal points.

For example, if a student takes 16 credit hours, earning an A in two 3-credit courses, a B in one 3-credit course, and a B in one 2-credit course, a C in a 3-credit course, and an F in a 2-credit course, the grade point average would be:

| | | | |
|---|---|---|---|
| 6 (credits of A) | x 4 (grade points per credit hour) | = | 24 |
| 5 (credits of B) | x 3 (grade points per credit hour) | = | 15 |
| 3 (credits of C) | x 2 (grade points per credit hour) | = | 6 |
| 2 (credits of F) | x 0 (grade points per credit hour) | = | 0 |
| | | | 45 |

The total number of grade points earned (45) divided by the number of credit hours attempted (16) equals the grade point average, in this case 2.813.

## ACADEMIC HONORS

High ranking students in their freshman year are eligible for membership in *Phi Eta Sigma* and *Alpha Lambda Delta*. Both of these national scholastic honoraries require a 3.500 semester grade point average or better during the first semester or a cumulative average of 3.500 for both semesters during the freshman year. Juniors ranking in the top three percent of their class, seniors ranking in the top six percent of their class, and outstanding graduate students are eligible for election to membership in Phi Kappi Phi, the university's most prestigious campus-wide scholastic honor society. Outstanding undergraduate and graduate students majoring in the arts and sciences are also eligible for election to membership in Phi Beta Kappa.

**Semester Dean's List** - A full-time undergraduate student who earns a semester average of 3.500 or better on 12 to 14 hours of course work for which grade points are earned or a semester average of 3.250 or better on 15 or more hours of course work for which grade points are earned will be placed on the Dean's List for that semester.

Students are not eligible for the Dean's List in any semester in which they receive an NC or IN grade. When IN grades are resolved, however, students who are otherwise eligible shall be added retroactively to the Dean's List for that semester. Dean's List recognition shall be noted on the student's semester grade report and permanent academic record.

**Graduation with Honors** - Undergraduate degree honor designations are:

Cum Laude - for GPA 3.250 through 3.499
Magna Cum Laude - for GPA 3.500 through 3.749
Summa Cum Laude - for GPA 3.750 and above

To be eligible for degree honor designations students must have completed at least two semesters *and* at least 30 credit hours at NC State.

**Valedictorian, Salutatorian, and Highest Ranking Scholar in a College** - To be eligible for consideration as valedictorian, salutatorian, or highest ranking scholar in a college, an undergraduate student must have received at least 100 academic credits at NC State (including credit by examination, advanced placement credit, and S/U courses.) These 100 credits may include no more than 20 transfer credits through programs officially sponsored by NC State. Specifically, these programs are

Cooperating Raleigh Colleges, National Student Exchange, International Student Exchange, NC State sponsored study abroad programs, and the affiliated hospital programs in Medical Technology.

All students whose accumulated grade point averages, based on all courses attempted at NC State, make them eligible for one of these honors, shall be so recognized. That is, in the case of ties, more than one student will receive the honor. However, in the case of ties for valedictorian, no salutatorian will be recognized.

### GRADE REPORTS

At the end of each semester or summer session, Registration and Records issues a grade report showing all grades earned during that grading period, as well as the record of all previous work taken at this University. The Student Grade Report is the official copy of grades received for course work completed at NC State. It is mailed to all registered students at their correspondence address at the conclusion of a semester or summer session.

**Change of Name or Address** - It is the student's responsibility to inform Registration and Records of any changes in name or address. Failure to do this may prevent prompt delivery of important University correspondence. News stories about Dean's List students are sent to North Carolina newspapers based on hometown information furnished by Registration and Records.

## CONTINUATION OF UNDERGRADUATE ENROLLMENT

This policy is effective for all undergraduate students as of the beginning of Fall 1995. See the 1995 Undergraduate Catalog (hardcopy) or view at the following World Wide Web address:

**http://www2.ncsu.edu/ncsu/provost/info/publications/ugcat /**

Provisions are made for students who were on Academic Warning I , Academic Warning II, and Probation and for students who were suspended as of the end of Spring 1995 and who remained suspended as of the end of Summer Session II 1995 are described under the heading "Transition of Continuing Students to the Continuation of Undergraduate Enrollment Academic Policy."

## MINIMUM ELIGIBILITY STANDARD

The minimum eligibility for continued enrollment for any undergraduate student is defined as achieving the required cumulative grade pointattempted at NC State plus transferred according to the Schedule of Performance Requirements for Continuing Undergraduate Enrollment, referred to hereinafter as the continuation schedule.

**Schedule of Performance Requirements For Continuing Undergraduate Enrollment**

| Credit Hours Attempted at NCSU Plus Credit Hours Transferred | Minimum Required Cumulative Grade Point Average on all Courses Taken at NC State |
|---|---|
| 1-35 | 1.500 |
| 36-47 | 1.600 |
| 48-59 | 1.700 |
| 60-71 | 1.800 |
| 72-83 | 1.900 |
| 84 or more | 2.000 |

Undergraduate students who, at the end of any regular semester, do not meet the minimum standards shown in the continuation schedule will not be allowed to continue their enrollment at the University during subsequent fall and spring semesters, with the following exceptions:

- no student will be suspended until the end of the student's second regular semester at NC State;
- any student who begins a given semester with a cumulative GPA of 2.000 or better will be eligible to continue in the next regular semester in which they seek enrollment regardless of academic performance in that given semester;
- students who are eligible to continue at the end of a spring semester will be eligible to continue into the following fall, regardless of summer session performance;
- students will be eligible to continue their enrollment until they have attempted at least twelve hours at NC State; and,
- suspended students re-admitted on appeal will be eligible to enroll on Academic Probation.

Every student with a cumulative GPA below 2.000 will be in one of three academic status: Academic Warning, Academic Suspension, or Academic Probation.

## ACADEMIC STATUS

### ACADEMIC WARNING

Every student who meets the foregoing conditions but whose cumulative grade point average is less than 2.000, the minimum for graduation, will be on Academic Warning Status. The Timely Advising Requirement applies to all students on Academic Warning Status.

### ACADEMIC SUSPENSION

Students who do not meet the foregoing conditions for eligibility to continue enrollment will be on Academic Suspension Status. Suspended students may be readmitted automatically as provided in the section on "Readmission of Suspended Students." Suspended students not eligible for automatic readmission may appeal to the University Admissions Committee for readmission; they should be encouraged to do so if they feel that circumstances which led to the academic difficulty have changed or can be better accommodated by the student. If re-admitted, the student will be eligible to enroll for one semester on Academic Probation Status.

### ACADEMIC PROBATION

Suspended students may appeal to the University Admissions Committeefor readmission on Academic Probation Status for one regular semester. Students will not be considered in good academic standing while on Academic Probation Status. Probationary students are subject to the same timely advising requirements as described above for students on Academic Warning. Those with significant involvement in extracurricular activities should be advised to carefully consider the impact of these activities on their ability to succeed academically during the probationary semester and to make adjustments accordingly. The University Admissions Committee may prescribe additional requirements as a condition of re-admission. Students who do not complete the probationary semester with a cumulative GPA above the suspension level will return to Academic Suspension Status.

### TIMELY ADVISING REQUIREMENT

All students on Academic Warning Status or Academic Probation Status are required to meet with their academic advisers during the first four weeks of classes in regular semesters to review their academic situations and to formulate or review and revise as needed their plans of study. Any student in either of these statuses who does not comply with these requirements to consult with the faculty adviser will not

be allowed to register for and continue enrollment at the University during subsequent fall and spring semesters unless the cumulative GPAis 2.000 or greater at the end of the semester in which the requirement was not met.

## READMISSION OF FORMER AND SUSPENDED DEGREE STUDENTS

An undergraduate degree student who fails to enroll or attend at all, during any regular semester, is considered a "former degree student and must re-apply for admission to continue. Readmission applications should be submitted as soon as possible but no later than 30 days prior to the date of desired enrollment. Former students returning should be aware that enrollment restrictions may be imposed at any time which may affect their readmission. A student who received a bachelor's degree must (a) apply for admission to the Graduate School, (b) register as a Post-Baccalaureate Studies Student through Lifelong Education; or (c) apply for readmission as a candidate for a second bachelor's degree or professional degree or as an undergraduate Unclassified Student.

A non-refundable fee is required for all applications. Contact the Department of Registration and Records for the current fee.

### READMISSION FOR STUDENTS ELIGIBLE TO CONTINUE

Students who were eligible to continue at NC State at the time of leaving are eligible to be readmitted to their former program provided they have a grade point average of 2.000 on all courses taken at NC State and provided there is space available.

A student who was eligible to continue at the time of leaving who has subsequently taken work at another institution and earned less than a C- average on such work must complete a readmission form and write a letter of petition to the University Admissions Committee.

A student who was eligible to continue at the time of leaving and whose grade point average is less than 2.000 will be:

- for readmission on Academic Warning status if the student's GPA is not lower than the level required to be eligible to continue under the current policy; or
- Considered for readmission on Academic Probation Status for one semester if the student's GPA is below the level required to be eligible to continue under the current policy.

- Considered for readmission on Academic Probation Status, if the student's grade point average on all courses taken at NC State is such that the student was or would have been suspended.

Former students returning who desire a change of curriculum must have their records transferred to the new school/college and submit a properly validated Curriculum Change Form to the Department of Registration and Records before readmission can be processed.

## READMISSION FOR SUSPENDED STUDENTS

### AUTOMATIC READMISSION

A student who is academically suspended may do one or all of the following:

- enroll in NC State courses during any number of summer sessions at NC State,
- enroll in NC State courses through independent studies, and/or
- enroll in NC courses via Cable or courses via videocassette.

*For further information regarding Cable or videocassette class, contact the Office of Telecommunications, 218 McKimmon Center, 515-7730.*

*Courses taken at an institution other than NC State or offered by some other institution through Independent Studies do not affect a student's suspension status at NC State.*

When by one or all of these methods a suspended student has improved his or her academic standing to the extent that the student is no longer academically suspended, that student becomes automatically eligible for readmission to a regular semester and no letter of appeal to the University Admissions Committee by the student is necessary.

### APPEAL TO UNIVERSITY ADMISSIONS COMMITTEE

A student who is academically suspended, who is ineligible for automatic readmission as described above, may appeal to the University Admissions Committee for readmission. Such students should be encouraged to do so if they feel that circumstances which led to the academic difficulty have changed or can now be accommodated successfully. If granted readmission, the student will be eligible to enroll for one semester on Academic Probation Status. A letter must be written to the Committee stating:

- the reasons for former academic difficulty with an explanation of extenuating circumstances;
- why the student believes he/she can now successfully meet all degree requirements within a reasonable length of time;

- the summer sessions, Independent Studies, or NC State off-campus courses that have been completed;
- the address and telephone number to be used by the Admissions Committee's for notification of a decision.

The Admissions Committee will not act on the appeal of any student currently enrolled in any summer sessions, Independent Studiesor off-campus courses.

Letters of appeal should be mailed to: Department of Registration and Records, Attention: Admissions Committee, NCSU, Box 7313, Raleigh, North Carolina 27695-7313. The letter must reach the Department of Registration and Records by the following deadlines:

- no later than two weeks before the first day of classes in the fall semester for students who did not attend summer school or who attended first summer session only;
- no later than one week before the first day of classes in the fall semester for students who attended second summer session; and
- no later than one week before the first day of classes in the spring semester.

The Admissions Committee meets prior to the first day of classes. All material must be received in accordance with the above dates.

## APPEAL TO UNIVERSITY ADMISSIONS COMMITTEE BY STUDENTS WHO HAVE NOT BEEN ENROLLED AT NC STATE FOR THREE OR MORE YEARS (CONTRACTUAL READMISSION)

After not being enrolled at NC State (excluding summer sessions Independent Studies, and NC State (off-campus courses) for a continuous three-year period or longer, a student whose former academic record at NC State was such that the student was suspended or would have been suspended under current policies, may petition the University Admissions Committee for contractual readmission.

The Committee will decide each case on its individual merits with special regard to the student's written appeal, the productive use of the three or more intervening years, evidence of motivation and achievement based on any academic work done during those three or more years, and a supporting letter from the department offering the curriculum into which the student requests admission. This letter must contain a proposed plan of study agreed to and signed by the student, the department

head, and the dean. If the curriculum into which the student requests admission is different from that in which the student was last enrolled, the petition to the Admissions Committee must also be accompanied by a Curriculum Change Form approved by the accepting dean.

If a contractual readmission is approved, the following conditions apply:

1. the student's entire academic record at NC State will be recorded on any subsequent transcript, including a grade point average on all work attempted at NC State.
2. for courses attempted prior to readmission, only work of C- or better will count toward fulfilling graduation requirements, providing that such courses meet current curriculum requirements.
3. for purposes of suspension and eligibility for graduation, a second grade point average will be calculated based only on courses that are attempted after readmission. Total hours for graduation and suspension will be based on all work at NC State after readmission plus former work of C- or better that is acceptable to the department plus hours transferred from other institutions.
4. the student must maintain an overall grade point average of 2.000 or better on all courses attempted after readmission.
5. students who fail to achieve an overall grade point average of 2.000 will lose their contractual readmission status. Their status for subsequent work as a degree student at NC State shall be determined on the basis of total hours attempted at NC State plus transferred hours and their grade point average calculated using all courses attempted at NC State.
6. a student may be readmitted under this option only once.

Once a student has received notice of readmission, the student should register using telephonic registration. The student's personal ID number will be included in the notice of readmission.

## WITHDRAWAL FROM THE UNIVERSITY

Students who wish to drop all the courses for which they are registered must withdraw from the University for the remainder of the semester or summer session in which they are enrolled. Students who have registered and prepaid are considered to be registered and must be officially withdrawn, unless they have notified the

University prior to the beginning of the first day of classes that they wish to have their registration canceled.

It is highly recommended, but not required, that students considering withdrawal consult their faculty adviser or departmental coordinator of advising. The withdrawal process is as follows:

1. Degree candidates and Unclassified students initiate the official withdrawal process with the Counseling Center, 2000 Harris Hall, 515-2423. Parental approval to withdraw may be required for single students who are under eighteen.
2. Lifelong Education students contact the Office of Adult Credit Programs & Summer Sessions, Registration Desk, McKimmon Center, 515-2265.
3 NC State students carrying course work at another campus under the interinstitutional arrangement must contact the Department of Registration and Records, 1008 Harris Hall, 515-2577, to initiate the paperwork necessary for removal from the class roll at the other institution.
4. Students visiting from other institutions who are registered for NC State course work under the Interinstitutional arrangement must initiate withdrawal on their home campus and contact the NC State Department of Registration and Records.

**INTRA-CAMPUS TRANSFERS (curriculum change)**

A former student returning who desires a change of curriculum must have his or her records transferred to the new college and submit a properly validated Curriculum Change Form to the Department of Registration and Records, 1000 Harris Hall, before readmission can be processed.

**TRANSFER CREDIT**

Transcripts of college course credit for new transfer students and for NC State students who have taken course work at another institution are evaluated by the dean of the appropriate school to determine how the work applies toward fulfilling the graduation requirements of each student's intended curriculum.

Students admitted to an NC State undergraduate degree program who wish to take courses at another institution must obtain prior endorsement from their academic department and prior written approval from their school dean in order to insure that the transfer credits will apply toward fulfilling specific graduation requirements.

Transfer credit is not recorded on former students' permanent records until after they have been readmitted and have re-enrolled.

## REPEATING COURSES

### COURSE REPEAT POLICY

- students who repeat a course, regardless if the grade previously made, will have both grades counted in their cumulative grade point average.
- undergraduate students may be allowed as many semester hours as are appropriate in the departmental curriculum for courses that (a) are titled seminar, special problems, special topics, independent study or research (and are usually numbered 490-499 or 590-599 and (b) cover topics different from those studied when the courses were taken previously. unless a course satisfies one or the other of the above conditions, the semester hours will be counted only once toward the number of hours required for graduation even though students repeat and pass the course both times.
- the adviser's approval is required for students to repeat any course previously passed with a C-; no approval can be given for a grade of A or B. Nor will it be given when:

  a)students wish to repeat a lower division course that they have passed with a grade of C- or better after having successfully completed an advanced course dealing with the same subject matter;

  b)students wish to repeat a lower level course that they have passed with a C- or better which is a prerequisite for an advanced course that they had already successfully completed;

  c)students wish to take an introductory course after they have successfully completed an advanced course dealing with similar material.

- students must not register again for any courses in which they have IN grades; such registration does not remove IN grades; and the completion of the course on the second occasion will automatically result in an F for the uncompleted course.

## FIRST YEAR COURSE REPEAT POLICY

For courses first attempted in Fall 1995 and afterwards

The first year course repeat policy is one of forgiveness that helps new NC State undergraduate students maintain good academic standing. The policy is necessary because new students lack familiarity with the University, and as a result, are more likely to make errors in their choice of courses and total course load.

### EFFECTS

- the eligible student who repeats a course while electing that the first year course repeat policy apply, will have the grade points and the credit hours attempted and earned on the first completion of the course removed from the calculation of the cumulative grade point average and from the calculation of the total hours attempted regardless of the grade earned on the second attempt. The modification of the cumulative grade point average which will result from the removal of the grade points and credit hours attempted and earned on the first completion of the course will be calculated and recorded on the student's record after the second completion of the course.
- the course title and grade for the first completion will be shown on the official record with a code (R) to indicate that it was repeated and that the first grade was removed from the computation of the cumulative grade point average.
- the recorded grade point average of the student for the semester in which the course was originally taken will not be changed.
- repeating a course and exercising the first year course repeat policy does not retroactively change the status of the student as to semester academic hours, academic warning, probation, or suspension in prior semesters.
- many graduate and professional schools recompute grade point averages in the process of considering an applicant for admission to such programs. This recomputation of grade point averages may include restoring the cumulative grade point average effects of initial attempts at courses repeated under this policy.

### ELIGIBILITY

1. the initial attempt and the repeat under this policy must be an NC State course;
2. the course being repeated was completed for the first time after the Summer Session II 1995;
3. the course being repeated must be at the 100- or 200-level.

4. the student received a grade below C- in the course that is to be repeated;
5. both attempts of the course were for letter grades; no unsuccessful audits or credit-only attempts may be repeated nor may repeats under the policy be made for audit or credit-only;
6. the student has not received credit for an advanced course dealing with the same subject matter as the course being repeated;
7. the *first* attempt of the course must have occurred within 12 months of the student's initial enrollment in any classification at NC State; this period is not lengthened by voluntary or involuntary failure to enroll in subsequent semesters of summer sessions, nor by enrolling at less than a minimum full-time load following the initial date of enrollment;
8. the *second* attempt is for the same course or for an approved substitute course.
9. the *second* attempt occurs in a regular semester or summer session which ends within 12 months of the completion of the first attempt of the course; if the course is not available during that period or if the student is not enrolled when it is available, then the second attempt must occur in the next regular semester during which the student is enrolled at NC State and the course is available;
10. the total number of courses repeated by the student under this policy will not exceed two (2) courses nor will the total of the hours of such courses exceed eight (8) hours, nor will the total number of courses repeated under this policy combined with those repeated under the Course Repeat Without Penalty Policy (see 1995 Undergraduate Catalog) exceed three (3) courses, nor will the total hours of such courses exceed twelve (12) hours;
11. the Notice of Exercise of First Year Course Repeat Policy is filed by the student with the Department of Registration and Records on or before the "last day to drop a course without a grade for courses at the 400 level and below" of the semester or summer session in which the course is repeated.

**PROCEDURES**

1. students are advised to consult with their academic advisers in making the decision to elect a course repeat under this policy.
2. the student must submit a Notice of Exercise of First Year Course Repeat Policy to the Department of Registration and Records on or before the last day to drop a course without a grade at the 400 level or below of the semester or summer session in which the course is repeated. Forms may be obtained from faculty advisers, departmental coordinators of advising, associate deans for academic programs, and the Department of Registration and Records.

## CREDIT BY EXAMINATION

Undergraduate students currently registered at NC State (degree, unclassified, or Lifelong Education) may request an examination for course credit in a course whether enrolled in that course or not, under the conditions described below. Students must initiate a request with their adviser (except when a teaching department awards credit based upon group testing for placement purposes). Should the adviser approve, the student must arrange for the examination with the department offering the course. The department may administer the examination in any manner pertinent to the materials of the course. Departments are encouraged to offer credit by examination in all courses but have the prerogative of excluding certain courses which are demonstrably unsuited for credit by examination.

The academic standards for credit by examination will be commensurate with the academic standards for the course. If a student's performance on the examination is judged to be of C- or higher quality, the department will notify the Department of Registration and Records on a Grade Change Report that the student has received Credit by Examination for the course. The Department of Registration and Records will enter the appropriate number of credit hours on the student's permanent academic record. Credits earned through Credit by Examination are not used in the computation of a student's grade point average.

The Department of Registration and Records will post course credit by examination to a student's permanent academic record only if that student is currently registered at NC State. However, if the course credit by examination would enable a student to complete the requirements for a degree, that student would not have to be registered in order to receive the credit.

If a student fails to achieve C- or higher quality work on an attempted credit by examination, no action is required other than the department's notifying the student. However, that student is not eligible for another such examination in the same course.

Once a student has failed a course or has completed for credit or audit more than fifty percent of a course, the student may not attempt credit by examination for that course. Under unusual circumstances, exceptions may be made upon the written recommendation of the student's adviser and the approval of the department offering the course. A student who receives credit by examination in a course in which that student is currently enrolled must officially drop that course no later than mid-semester.

## CREDIT BY EXAMINATION THROUGH INDEPENDENT STUDIES

Persons who are not currently enrolled on campus and who have gained through study or experience, knowledge of the content of undergraduate credit courses offered through Independent Studies may (with the approval of the Independent Studies staff and the academic department offering a course) receive credit for that course by special examination. Students may request approval to attempt credit by examination by completing and submitting a form available from Independent Studies, The University of North Carolina, Box 1020, The Friday Center, Chapel Hill, North Carolina 27599-1020, (919) 962-1104.

Currently enrolled students are not eligible for credit by examination through Independent Studies. These students should go directly to the appropriate academic department to request credit by examination under the regular procedures in effect on campus.

## CREDIT-ONLY OPTION FOR FREE ELECTIVE COURSES

Each undergraduate student has the option to count toward graduation requirements a maximum of 12 semester hours in the category of credit-only courses (exclusive of physical education and other courses authorized to be graded on Satisfactory-Unsatisfactory basis). The student may select as credit-only any course offered by the University except those in Military Science and Aerospace Studies. The selected courses must be included under the free elective category of the specific curriculum in which the student is enrolled. The student will be responsible for attendance, assignments, and examinations.

The student's performance in a credit-only course will be reported as S (satisfactory grade for credit-only course and given when course work is equivalent to C- or better) or U (no-credit grade for credit-only course). The grade for a credit-only course will have no effect on the student's Grade Point Average. The course and its grade will be counted in the cumulative hours attempted. *Credit-only courses do not count in the calculation of eligibility for the Semester Dean's List, which requires either twelve hours or fifteen hours of course work for which grade points are earned.*

Lifelong Education students may take on a credit-only basis any course for which they satisfy prerequisites.

Students should be aware that many graduate and professional schools evaluate credit-only courses for which "U" grades were awarded as failing grades.

## AUDITS (UNDERGRADUATE)

Students wishing to audit a course before or after taking it for credit must have the approval of their adviser and of the department offering the course. Auditors are expected to attend class regularly. The degree to which an auditor must participate in class beyond regular attendance is optional with the instructor; any such requirements should be clearly explained in writing to the audit or at the beginning of the semester. Should the instructor conclude that poor attendance has resulted in an auditor's gaining little from the course, the instructor should mark NR (no recognition given for an audit) on the final grade report. Students who have taken a course for audit may, with their adviser's approval enroll in the course for credit during a subsequent semester or summer session. For tuition cost purposes, audits are treated as full credit value. For all other purposes, hours of audit do not count in calculating undergraduate course loads.

*Note: Veteran's benefits are governed by Veterans Administration regulation concerning audits. Public Law 94-502 (G.I. Bill) and Public Law 64 (sons and daughters of deceased or disabled veterans) consider only courses being taken for credit when determining a student's load for benefit purposes. For information, contact the Veterans Affairs Office, 1000 Harris Hall, (919) 515-3048.*

## INTRA-CAMPUS TRANSFERS

Undergraduate students wishing to change from one curriculum to another must report to the dean's office of the college offering the curriculum in which entrance is desired and request acceptance into the new college or curriculum.

*A student who has attempted fewer than twelve credit hours at NC State may transfer to another curriculum provided that student meets the admission requirements of the intended new curriculum. A student who has attempted twelve or more credit hours at NC State may transfer to another curriculum provided that student is eligible to do so under the intra-campus transfer policy which pertains to the intended curriculum.*

If acceptance is approved, a Curriculum Change Form will be issued, bearing the signature of the accepting dean. If the former curriculum was in a different college, the Curriculum Change Form should be submitted for the signature of the releasing dean with the request that all records be transferred to the new college and department. From the standpoint of advising, registration, and adding and dropping courses, the student is considered to be in the new curriculum as soon as the Curriculum Change Form is completed and filed with the Department of Registration

and Records and the records of the student have been transferred to the new department.

# Code of Student Conduct

All students who enroll at NC State are required to adhere to the Code of Student Conduct. This code... "sets out the kind of behavior that disrupts and inhibits the normal functioning of the University, and what action it will take to protect the community from such disruption." Academic and Non-Academic Misconduct, both on and off campus are addressed in the Code. Students charged and found guilty of violating the Code of Student Conduct will receive sanctions that may range from an oral reprimand to expulsion from the University. For more information contact the Office of Student Conduct at 515-2963 or access the Code at the following World Wide Web site:

**http://www2.ncsu.edu/ncsu/stud_affairs/policies/code95.html**.

# Student Services

### ACCIDENT AND HEALTH INSURANCE

The University offers students an accident and health insurance program. The insurance covers the surgical, accident, and hospital needs of participating students as a supplement to the Student Health Service. Each year complete information is available to students at the start of the fall semester.

### THE UNIVERSITY CAREER CENTER

The University Career Center's goal is two-fold: to assist students in developing their career objectives and to provide a link for students to the employment world. It offers assistance to all students at the University on a year round basis.

To assist in career development the Center provides individual counseling and small group career decision-making seminars. Center staff promote, arrange, and coordinate job interviews between students and employer representatives, schedule visits of recruiters to campus, refer student resumes to requesting employers, and maintain job vacancy announcements. In addition, career advisors recommend contacts with employers, and maintain job vacancy announcements. In addition, career advisors recommend contacts with employers not visiting campus, conduct

information sessions on the job search process, and maintain the Center's home page. The Center maintains an extensive library of career and job information. In addition, the Center helps students find internships, summer, and part-time jobs related to their career objectives.

## CHAPLAIN'S COOPERATIVE MINISTRY

The Chaplains' Cooperative Ministry at NC State is an interfaith organization which both supports individual campus ministries and plans jointly sponsored interfaith programs for students, faculty, and staff. Its members, both ordained and non-ordained, strive to be leaders within the University as inquiry, dialogue, development, and trust are engaged with trust at all levels.

The office has a prominent location off the first floor lobby of the University Student Center and the current membership is through the Department of Student Development. Ministries within member groups support the spiritual and emotional growth of students through scriptural studies, worship, meals, socials, various outings, retreats, mission trips, counseling, service projects, and opportunities for leadership. Following is a list of current phone numbers and addresses:

| | |
|---|---|
| Chaplin's Cooperative Ministry<br>1200 Student Center, Box 7396, NCSU, 27695 | 515-2414 |
| Department of Student Development (University Liaison)<br>2009 Harris Hall, Box 7314, NCSU, 27695 | 515-2441 |
| Baptist<br>2702 Hillsborough St., 27607 | 834-1875 |
| Campus Christian Fellowship<br>P.O. Box 5182, 27607 | 859-6800 |
| Campus Crusade for Christ/Athletes in Action<br>1912 Myron Dr., 27607 | 782-3393 |
| Catholic<br>Aquinas House, 600 Bilyeu St., 27607 | 833-9668 |
| Cloud and Fire Express (coffehouse)<br>2512 Hillsborough St., Raleigh, 27607 | 834-5229 |

| | |
|---|---|
| Episcopal<br>Sarah F. Cheshire House, 2208 Hope St., 27607 | 834-2428 |
| Hillel<br>1200 Student Center, Box 7306, NCSU, 27695 | 515-4183 |
| Intervarsity<br>5014 Dunwoody Tr., 27607 | 851-8626 |
| Lutheran<br>2723 Clark Ave., 27607 | 828-1433 |
| Methodist<br>2503 Clark Ave., 27607 | 833-1861 |
| Metropolitan Community Church<br>St. John's, 805 Glenwood Ave., Box 5626, 27650 | 834-2611 |
| Moravian<br>Raleigh Moravian, 1816 Ridge Rd., 27607 | 515-2012 |
| Presbyterian<br>Box 5635, 27650 | 834-5184 |
| REACH Campus Ministries<br>700 Brooks Ave., 27607 | 821-2400 |
| Unitarian Universalist<br>3313 Wade Ave., 27607 | 781-7635 |

## COUNSELING

The Counseling Center assists individuals in gaining a better understanding of themselves. Psychologists, professional counselors, and psychiatrists are available to work with students who desire assistance with concerns such as choosing a career, academic planning, identifying and overcoming educational difficulties, developing greater self-understanding, developing more satisfying personal relations, and coping with stress or emotional crisis. All counseling is strictly confidential.

In addition to individual counseling, workshops and support groups are offered throughout the year in a variety of areas, including vocational exploration and stress reduction.

The Counseling Center is located in 2000 Harris Hall and maintains evening hours several evenings each week. Appointments may be scheduled by calling (919) 515-2423.

## FOOD SERVICE

University Dining, the University's food service department, has 13 campus locations to serve students, faculty, and staff. Awarded the Ivy Award by *Restaurant & Institutions* magazine in 1988, University Dining is recognized nationally for exciting and innovative concepts in campus dining.

The Fountain Dining Hall, located on West Campus serves as the main hub for the meal-plan program. The Dining Hall offers its patrons an all-you-can-eat menu in a modern, comfortable atmosphere that breaks from the traditional cafeteria-style service. The Dining Hall is open seven days a week, with brunch and dinner served on weekends. A registered dietician is on staff to assist with dietary restrictions and to provide nutritional or diet counseling.

***Meal Plans.*** *Freshmen who live in the residence halls are required to participate in one of many University Dining meal plans,* each tailored to meet different needs. All seven meal plans are designed with both structure and flexibility. The structured element of the program is a set number of meals served in an all-you-can-eat fashion in the main Dining Hall. The flexible element is a Cash-Points system. Part of the meal plan purchase price is directly converted to a non-refundable Cash-Points account that can be used only at University Dining locations on campus. Cash-Points are a dollar-for-dollar equivalence built into each meal plan to allow students the flexibility of eating meals away from the Dining Hall. The meal program is designed to allow students to chose the number of structured meals and the amount of flexible Cash-Points.

University Dining takes pride in offering quality food and services designed specifically to meet the wants and needs of students. These seven meal plans provide students with varied menu choices and the utmost in convenience. *For more information on meal plans contact the AllCampus Office, West Dunn Building, (919) 515-3090.*

## DISABILITY SERVICES

Students requiring special assistance because of visual, hearing, or motor disabilities should contact Disability Services for Students (DSS), NC State, Box 7312, 2000 Harris Hall, Raleigh, North Carolina 27695-7312, (919) 515-7653 (Voice/TDD). Interpreter, tutorial, note taker and/or reader services are available by contacting the center.

Direct services for all learning disabled students, such as educational counseling and arrangements for appropriate academic support, can also be initiated by DSS.

Those students needing special assistance in scheduling courses should make contact as far as possible in advance of preregistration deadlines.

## HEALTH

The University seeks to safeguard the health of the students in every way possible. The Student Health Service, located in Clark Hall, offers medical care to students on an outpatient basis. The facility is staffed by full-time physicians, registered nurses and other medical support personnel.

The Health Service is open for outpatient medical care from 8 a.m. to 11 p.m., Monday - Friday and 8 a.m. to 4 p.m. on weekends during fall and spring semesters (excluding breaks). Physicians maintain regular office hours Monday - Friday and are on call at other times. A nurse staffed clinic is operated during evenings and weekends. Patients are seen by appointment (515-7107); Gynecology (515-7762). Summer session hours are Monday - Friday, 8 a.m. to 5 p.m.

All registered students pay a medical fee which covers outpatient professional services; i.e., visits to a nurse or physician, routine laboratory procedures and some medications available in the student pharmacy. There is a nominal charge for x-rays, some lab tests, allergy injections, prescription medications and special clinics. Students are responsible for the cost of laboratory tests and x-rays which must be performed by an off-campus agency, medications not available in the student pharmacy, and expenses incurred when referred to an off-campus physician or hospital.

All health and medical information is confidential and is not divulged to anyone without the written consent of the patient.

Health Educators offer a variety of information, programs, and services to students. Health topics include weight-control, alcohol and drug education, stress management, first aid, sexually transmitted diseases, women's issues, and more. Call 515-WELL (9355) for information.

## LAUNDRY AND DRY CLEANING

The University is currently providing a laundry and dry cleaning facility on campus at reasonable prices.

## BOOKSTORES

The official campus source for all course-books is the Bookstore, consisting of the main store, located on East Dunn Avenue, the North Campus Shop, located in the lower level of Erdahl-Cloyd Annex of the D. H. Hill Library, and the Century Shop located in Research III, Centennial Campus. At the main store, the book division provides textbooks, fiction, non-fiction, technical and reference titles, publishers' overstock and remainders, college outlines, paperbacks, book reviews, periodicals, and calendars. The merchandise division carries school supplies, personal computers with accessories and supplies, art and engineering supplies, greeting cards, health and beauty aids, imprinted sportswear, souvenirs, and convenience items. Special orders are accepted for books and merchandise. Purchases may be charged by VISA, MasterCard, Discover, or AllCampus Money Card. During the opening of fall and spring semesters, the main store is open specified evenings, in addition to each Tuesday evening and Saturday when classes are in session. North Campus Shop specializes in computer supplies, sale books, magazines, college outlines, greeting cards, souvenirs, gifts, and convenience items. The entire operation of the Bookstore is completely self-supporting, with its annual surplus transferred to NC State Scholarship Fund.

## TRANSPORTATION

All vehicles parking on campus during the hours of 7:30 a.m. - 5:00 p.m., Monday through Friday, must display an appropriate NC State permit. Freshmen residents and off-campus students living within a one mile radius of campus are not eligible for campus parking permits. Permits are distributed through a year-round registration process. As permits become available throughout the year, they are assigned according to a "wait list." Transportation alternatives include the University's Wolfline bus service, motorcycles, mopeds, bicycles, and car pools.

Wolfline operates when classes are in session, Monday through Friday. All Wolfline buses travel along designated routes and stop at signed Wolfline bus stops. A valid student AllCampus Card is all that is required to ride the bus. Route and schedule brochures are available at D. H. Hill Library, the Student Center, NC State Bookstores, and the Division of Transportation. The citywide bus service, Capital Area Transit (CAT), is available for students living throughout Raleigh.

Bicycling offers an inexpensive alternative. Bicycle registration is required and will assist in recovery if the bicycle is lost or stolen. Bicycles may be registered with Transportation, Public Safety, or the residence halls at no charge.

For more information on parking and transportation, contact Division of Transportation, NC State, Box 7221, Raleigh, North Carolina 27695-7221, (919) 515-3424.

## STUDENT ACTIVITIES

The University make every effort to provide surroundings which are pleasant and conducive to intellectual growth. In addition, a wide variety of athletic, cultural and social opportunities are available to students. Through the services and activities affiliated with campus life, as well as through extracurricular organizations and functions, students at NC State may acquire experience in group leadership and community living to supplement and enrich their education.

### STUDENT GOVERNMENT

Every NC State student is a member of a community which exercises executive, legislative and judicial authority in matters of student life. Students have a voice in government through participation in campus-wide elections of officers, legislators, and judiciary members. For more information, contact Student Government at (919)515-2797.

### CLUBS AND SOCIETIES

**Honorary.** University-wide honorary societies include Golden Chain, senior leadership; Thirty and Three, junior leadership; Phi Eta Sigma and Alpha Lambda Delta, freshman scholarship; Gamma Beta Phi, scholarship and service; and Phi Beta Kappa and Phi Kappa Phi, junior, senior and graduate student scholarship.

**Professional and Technical Organizations.** The colleges and departments sponsor or supervise a large number of professional and technical societies and clubs. These organizations contribute substantially to the students' professional and social growth.

**Fraternities and Sororities.** Fraternities and sororities are included in the many educational programs at NC State. Fraternal groups provide opportunities for students to develop skills of social interaction, sensitivity to the rights and needs of others, and leadership and management experience.

Twenty-four general college fraternities have chapters at NC State. They are Alpha Gamma Rho, Alpha Phi Alpha, Delta Chi, Delta Sigma Phi, FarmHouse, Kappa Alpha, Kappa Alpha Psi, Kappa Sigma, Lambda Chi Alpha, Omega Psi Phi, Phi Beta Sigma, Phil Delta Theta, Phi Kappa Tau, Pi Kappa Alpha, Pi Kappa Phi, Sigma Alpha Epsilon, Sigma Alpha Mu, Sigma Chi, Sigma Nu, Sigma Phi Epsilon, Sigma Pi, Tau Kappa Epsilon, Theta Chi, and Theta Tau.

NC State has ten national general college sororities. They are Alpha Delta Pi, Alpha Kappa Alpha, Alpha Phi, Chi Omega, Delta Sigma Theta, Delta Zeta, Sigma Gamma Rho, Sigma Kappa, Zeta Phi Beta, and Zeta Tau Alpha.

Many fraternities and sororities offer housing opportunities as an additional benefit of membership.

**Pershing Rifles.** This is a professional and social fraternity open to students enrolled in any ROTC courses. Members of the Pershing Rifles participate in ceremonies such as the Color Guard for NC State athletic events and Pennant Guard for home football games. Pledge period is one semester, and focuses on the history and traditions of the Pershing Rifles, as well as technical ability in the mastery of drill and ceremonies.

**The Ranger Challenge Team.** Open to all members of the Wolfpack Battalion. Members participate in intercollegiate competitions of military skills, including rifle marksmanship, hand grenades, ruck marching, patrolling, weapons assembly, the APFT, and rope bridge construction. NC State's Ranger Challenge Team is consistently one of the best on the east coast. Sponsored by Army ROTC, it competes against other schools in North and South Carolina, as well as schools on the east coast.

**The Leadership Reaction Course.** Operated by the Department of Military Science, this program provides practical experiences in small-group leadership, and it focuses on problem-solving and decision-making skills, using rotating group leaders to direct the team in negotiating several formidable obstacles. The course is available to student organizations officially approved by the university. Coordination must take place in advance with the Professor of Military Science.

**Other Organizations.** There are over 250 other student organizations. Students interested in exploring these organizations or in creating a new organization, may contact the Department of Student Development, Box 7314, Harris Hall, (919)515-2441.

## STUDENT MEDIA

NC State students have the opportunity to edit and manage a variety of student-oriented media. By working with these media, students may gain valuable extracurricular experience in journalism, broadcasting, production and design, leadership and management.

There are five media staffed by students and supported in large part by a designated portion of each student's non-academic fees.

The *Agromeck,* the University yearbook, provides a record in words and pictures of student and campus activities during the past year.

The *Nubian Message*, published twice a month, provides news and features about the African American community.

The *Technician*, the student newspaper, is published three times a week.

The *Windhover*, the campus literary and visual arts magazine, is published each spring.

**WKNC (88.1 FM)**, the student radio station, operates at 3000 watts, enabling it to be heard within a 42-mile radius of Raleigh. The station operates 24 hours a day with a full staff of engineers, disc jockeys, and news personnel.

Several of the colleges have their own publications dealing with material of special interest to students in these areas. The publications include Agriculture and Life Sciences' *Agri-Life*, Forest Resources' *Pi-Ne-Tum*, Engineering's *The Southern Engineer*, Textiles' *The Textile Forum*, Design's *The Publications of The School of Design*, and Physical and Mathematical Science's *The Scientist*.

## MUSICAL ORGANIZATIONS

Since the early days of NC State, musical organizations have played an important part in campus life, presenting concerts, furnishing music for official University functions and performing at athletic events. Indeed, participation in musical organizations has provided many opportunities for students to develop artistically as well as intellectually, and to balance the rigors of other academic study with educational experiences that provide pleasure and satisfaction.

Musical organizations are scheduled to complement the University academic class schedule and are offered to students of varying ability and differing interests.

The majority of organizations receive one academic credit which may be used to satisfy University free elective requirements in any academic major. Membership in all musical organizations requires an audition with the instructor.

## UNIVERSITY STUDENT UNION

The **University Student Union's** Visual and Performing Arts and Activities Programs is the umbrella, organizational structure for most of the major arts and activities programs presented at North Carolina State University. **The Union** seeks to create "A Perfect Union of Arts and Activities" for all members of the University family - students, faculty, staff, administration, alumni, and guests. **The University Student Union** consists of eight arts and activities programs presenting more than 900 events per year: **Cinematic Arts Program** (provides an international film series, a series of independent and experimental film makers, and a popular commercial film series), **Center Stage at Stewart Theater** (presents a wide variety of touring professional performing arts events), **The Crafts Center** (offers hands-on course work in a variety of crafts including pottery, fiber arts, photography, flat glass and woodworking), **Dance Program** (provides credit and non-credit opportunities in dance, with two student dance companies and classes in technique, choreography and performance), **Music Department** (offers 11 choral and instrumental performance ensembles, available to students for credit and non-credit participation, course work in music theory, history, composition and performances, and an 18-hour music minor), **Student Center Activities Office** (consisting of the Union Activities Board's eight student committees, the Student Leadership Center, and the Cinematic Arts Program), **Thompson Theater** (is a student-producing theater, staging up to 13 productions annually, offering credit and non-credit participation in acting, direction, stage management and theater design, and an 18-hour theater minor), **Visual Arts Center** (hosts exhibitions annually, and manages the University's permanent collections of textiles, ceramics, paintings, sculpture, furniture, photography and architectural, visual, graphic and products designs), and four support offices **(Administrative Office, Business and Computer Planning, Reservations Office and Facilities Maintenance)**. The University Student Union's programming is carried out in four facilities: University Student Center, Witherspoon Student Center, Price Music Center, and Thompson Building.

## CENTER STAGE AT STEWART THEATER

Center Stage presents more than 20 professional performing arts events annually in Stewart Theater. Performances include jazz, dance, drama, comedy, experimental theater, world music and traditional music. Stewart Theater is also the home to many other campus-sponsored events. Special rates are available to NC State students, faculty, and staff.

### Cinematic Arts Program

The Cinematic Arts Program is a 500-seat Campus Cinema located on the first floor of Witherspoon Student Center. The Passport International Film Series and the Southern Circuit Film and Lecture Series, which features showings of work and discussion by contemporary cinema photographers, are presented annually in the Campus Cinema. The UAB Films and UAB Lectures Committees select films and speakers for these and other series. For more information, call 515-5161.

### The Crafts Center

Located on the ground floor of the Thompson Building is one of the finest crafts facilities on any university campus. In 1996, The Crafts Center was awarded the Raleigh Medal of Arts for extraordinary achievement in the arts. Instruction is offered in pottery, woodworking, photography, weaving, flat glass, lapidary, telescope making, art, and much more. Studios are also available for independent work. The Crafts Center is open year-round and showcases between three and five exhibitions in a gallery dedicated to fine craft. A class in General Ceramics (TED 351) is offered for credit through the Department of Technology Education.

### Dance Program

The Dance Program sponsors two student dance companies, NC State Dance Company and DanceVisions. Both companies are open by audition and offer performances on and off campus each semester. In cooperation with the Department of Physical Education, the Dance Program offers classes in dance technique, choreography and performance, plus master classes, lecture-demonstrations and performances by guest artists.

## MUSIC DEPARTMENT

Music performance organizations have been an important part of campus life for much of University's history. Students in these groups perform in concerts and recitals on and off campus, participate in athletic events, and furnish music for official University functions. Each of the following ensembles is offered for academic credit. An audition with the instructor is required. For more information, please contact the Music Department office: telephone: (919) 515-2981; fax (919) 515-4204; e-mail: robert_petters@ncsu.edu. (Director of Music).

**Chamber Music.** Students may elect to perform in a small ensemble of traditional or non-traditional instrumentation. Students with similar abilities will be placed in an ensemble by a faculty member or coach if an appropriate instrument grouping and rehearsal schedule can be established.

**Choral Ensembles.** Students may select from five diverse ensembles currently offered for credit: Women's Choir, Varsity Men's Glee Club, Chamber Singers, New Horizons Gospel Choir, and the Raleigh Oratorio Society Symphonic Choir. The Choral Department offers students from all academic areas an opportunity to participate in the exploration and performance of the highest quality of choral repertoire spanning five centuries. Performance highlights have included concert tours of the Eastern United States and France, performances with the North Carolina Symphony, appearances at the North Carolina Music Educators Conference, as well as fall and spring concerts in Stewart Theater on the NC State campus.

**NC State Pipes and Drums.** Students may play the bagpipes, an instrument known to many of North Carolina's earliest settlers, in order to represent the university through this unique and distinctive medium. Pipes, drums, and other equipment are furnished. Beginning pipe and drum lessons are available to students without previous experience

**Orchestras.** Members of the Raleigh Civic Symphony and other orchestral ensembles include NC State students, faculty, and staff, students and faculty from area colleges and universities, and community members. Placement is made according to individual ability, interest, and experience. A wide range of orchestra music is read and performed, with concerts given on and off campus.

**Winds and Percussion Ensembles.** The Marching Band, Wind Ensemble, Symphonic Band, Concert Band, British Brass Band, Jazz Ensemble, Percussion Ensembles, Clarinet Choir, and Pep Bands comprise the Winds and Percussion program. The Marching Band is active during football season; the Pep Bands during basketball season. Other bands and ensembles usually meet both semesters.

Placement in a band or ensemble is made according to student ability and interest. All Pep Bands members also must be enrolled in one of the above bands or ensembles during the semester they play with the Pep Band.

## STUDENT CENTER ACTIVITIES OFFICE

The Student Center Activities Office sponsors the Union Activities Board, the Student Leadership Center, and the Cinematic Arts Program (see Cinematic Arts Program listing).

The **Union Activities Board** (UAB) is a student-directed programming network of eight committees which plan and implement a variety of programs for the campus community, including the Black Students Board, College Bowl, Entertainment Committee, Films Committee, Leisure & Recreation Committee, International Activities Committee, Leadership Development Committee, and Lectures Committee.

The **Student Leadership Center**, sponsored by the University Student Center Activities Office, offers a variety of programs such as the Leadership Development Series and the role Model Leader's Forum that are designed to give all NC State students the opportunity to explore the nature of leadership and to develop their leadership potential and skills in living. The Leadership Development Series consists of approximately 25 non-credit workshops that focus on different aspects of leadership. The workshops are offered Monday through Thursday evenings. Further information may be obtained from 3114 University Student Center, (919) 515-2452.

The **NC State Team Challenge** (Ropes Course) is a series of initiatives offering lessons in communication, leadership, ethics, conflict resolution, diversity, teamwork, and trust.

The **Leadership Certificate Program**. You design! Complete dive Core Competency Workshops plus five electives of your choice and receive a Leadership Certificate from your College or School (awarded to currently enrolled NC State students only).

**Descriptive Leadership Transcript**. Dynamic resume supplement informs employers of your commitment to developing personal leadership skills. Describes workshops you've completed as well as other accomplishments at NC State.

**Role Model Leaders' Forum**. Listen to national and international leaders speak their mind on the topic of leadership, follow-up with a question and answer session and a reception. Call 515-2452 for more information.

**Leadership Library** contains over 250 leadership reference materials available for checkout (books, audio cassettes, videotapes, newsletters). A complete listing is available on-line. Open 8:00 am to 5:00 pm, Monday through Friday. Available to NC State students, faculty and staff. FREE!!

## THOMPSON THEATER

Thompson Theater is North Carolina State University's volunteer student theater, housed within the Division of Student Affairs. Under the direction of a full-time professional staff, Thompson Theater continues its tradition of quality productions in the performing arts.

Four major shows are produced each season, a children's theater production that also tours North Carolina schools in the spring, two student-directed studio productions, the annual Madrigal Dinner and TheatreFest, a summer season that features local professional and student artists.

Thompson Theater offers a blend of student volunteer productions and academic theater training. Productions are open to all NC State students, whether or not they are enrolled in theater courses, thus providing an extra-curricular production program. Classes are available in acting, directing, introduction to theater, and all areas of technical theater, including stage craft, costume, make-up, lighting, and scenic design. Communication majors can receive a Theater Minor.

Theater student organizations, open to all NC State students, include University Players, Alpha Psi Omega and Black Repertory Theater.

## VISUAL ARTS CENTER

The arts are an essential component of a complete university education, and the Visual Arts Center provides North Carolina State University students direct and unique access to the visual arts. Since 1979 The Visual Arts Center has been responsible for the development and conservation of North Carolina State University's collection of photography, paintings, ceramics, textiles, furniture and architectural drawings by regional and national artists.

The Visual Arts Center's two galleries are located on the second floor of the Student Center at 3302 Cates Avenue and offer a series of exhibitions, free and open to the public, featuring the best examples of regional, national and international art.

The Visual Arts Center also offers internships, educational programs and tours for North Carolina State University students.

The Administrative offices of the Visual Arts Center are located on the third floor of the Student Center and the phone number is 919/515-3503.

## UNIVERSITY STUDENT UNION FACILITIES

**University Student Center** is the location for a variety of facilities, programs, and services designed to offer rest, relaxation and recreation, as well as cultural, social, leadership and artistic development. Facilities in the University Student Center building include several lounge areas; 18 meeting and activity rooms, available by reservation to all campus organizations, with access to catering and audio-visual services; two television lounges; Jeremiah's Game Room; a variety of dining opportunities, including The Underground Pasta and Grill Restaurant, Commons Cafe and Emporium Convenience Store; Center Stage at Stewart Theater and the Visual Arts Center. Program offices include the International Student office, Chaplains' Cooperative Ministry, Student Legal Services, and University Dining administrative and catering offices. Service areas include the Reservations and Facilities Management Offices, Information Center and Ticket Central.

**Witherspoon Student Center**, located three blocks west of the main building, houses the African-American Cultural Center, Student Government Offices, Sorority/Fraternity Group Buying Network, the Media Authority and offices of five student-run media organizations - *Technician* and *The Nubian Message* (newspapers), *Agromeck* (yearbook), *Windhover* (literary magazine), and WKNC FM 88.1 (radio station). The Witherspoon Student Center Annex also includes several lounge areas, including two balconies; one meeting room available by reservation; the African-American Cultural Center's Multi-Purpose Room, Gallery and Library; and the Campus Cinema, used for films, lectures and special events.

**Price Music Center** is the location for the Music Department and its programs.

**Thompson Building** is the location for Thompson Theater and The Crafts Center.

## INTERCOLLEGIATE ATHLETICS

The Department of Athletics conducts the University's intercollegiate athletics program involving 11 varsity sports for men, nine for women, and one co-ed.

The athletics program is administered by the Athletics Director with the Athletics Council, made up of 11 faculty, three alumni, two members of student government, two student athletes, and one coach, serving in an advisory capacity to the Athletics Director and Chancellor. The program is self-supporting and is operated through gate receipts, radio and television revenues, and student fees. Funds for athletics grants-in-aid are provided through the North Carolina State Student Aid Association (Wolfpack Club). Grants-in-aid are based upon the recommendation of the coach of each sport, approved by the Athletics Director, and awarded by the University's Financial Aid Office.

Men's varsity sports include soccer, cross country, and football in the fall; basketball, swimming, indoor track, and wrestling in the winter; and track, golf, tennis, and baseball in the spring. Varsity sports for women are soccer, cross country, and volleyball in the fall; basketball, indoor track, swimming, and gymnastics in the winter; and track and tennis in the spring. During the winter the co-ed rifle team competes.

The University facilities include Carter-Finley Stadium (45,600 seats); Reynolds Coliseum (12,400 seats for basketball); Doak Field (3,800 seats for baseball); the Paul H. Derr Track Stadium (3,000 seats) with a nine-lane tartan track; a 2,200 seat swimming stadium with a 25-yard by 25-meter pool and a 50-meter training and competition pool; a soccer field (5,000 seats); and a 12-court all-weather tennis complex. In addition, the Wolfpack athletics administrative offices, women's intercollegiate coaches' offices, several men's sports coaches' offices, and an athletics dining hall are housed in the Case Athletics Center. The Weisiger-Brown General Athletics Facility houses the football, track, and wrestling coaches' offices, a weight room, a wrestling room, a training room, an equipment room, and dressing rooms for football, wrestling, and track. Reynolds Coliseum has a weight room, training room, and locker and dressing facilities for the women's sports and dressing rooms for the men's sports of basketball, baseball, soccer, and tennis.

## INTRAMURAL-RECREATIONAL SPORTS

NC State maintains an extensive program of intramural-recreational sports administered by the Department of Physical Education. This program is composed of divisions in intramurals, club sports, informal recreation, fitness, and outdoor

adventures. Additional opportunities are available in extramural sports and special events. The program offerings are available to all students, faculty, and staff.

Seventeen sports are scheduled through intramurals including basketball, flag football, softball, soccer, volleyball, badminton, bowling, cross-country, golf, handball, pitch & putt, racquetball, squash, swim meets, table tennis, tennis, and track meets.

There are 30 active clubs with seven seeking affiliation to active status. The active club sports are aikido, angling, archery, baseball, bowling, cricket, cycling, equestrian, frisbee, ice hockey, judo, lacrosse (men), lacrosse (women), outing, racquetball, rodeo, rowing, rugby, sailing, snow skiing, soccer (men), soccer (women), tae kwon do, tennis, triathlon, volleyball, water polo, water skiing, windsurfing, and wrestling. Those seeking affiliation are fencing, field hockey, golf, mountain biking, roller hockey, social ballroom dance, and weight lifting.

Some of the activities included in informal recreation are archery, backgammon, croquet, darts, free throw/hot shot contest, grass volleyball, home run derby, pickleball, putting contest, spades tournament, and wallyball. Fitness activities include a variety of aerobic sessions, aqua aerobics, fit pack, and (WSR) walking, swimming, and running. Additionally, there are fitness workshops in the areas of back care, cross-training, foot care, injury prevention, massage, nutrition, stress management, swimming stroke clinic, weight training, and yoga. Extramural sports provides for participation in "Big Four Sports Day," a competition between Duke, NC State, UNC-Chapel Hill, and Wake Forest. Students also participate in the National Flag Football Championship and Schick Super Hoops.

The outdoor adventures division provides trips for backpacking, birding, camping and hiking, canoeing and kayaking, and wildlife art exposition. Instructional workshops are offered for backpacking and expedition planning, canoeing and fishing, photography, rockclimbing, and wilderness cooking. The outdoor adventures storehouse contains various equipment available for checkout to all students, faculty, and staff.

The Intramural-Recreational Sports Program is comprehensive in scope and committed to meeting the sports and physical activity needs of the students, faculty, and staff at North Carolina State University.

# COLLEGES, DEPARTMENTS, AND PROGRAMS OF STUDY

Undergraduate programs of study are offered by the College of Agriculture and Life Sciences, the School of Design, the College of Education and Psychology, the College of Engineering, the College of Forest Resources, the College of Humanities and Social Sciences, the College of Management, the College of Physical and Mathematical Sciences, and the College of Textiles.

## GENERAL EDUCATION DISTRIBUTION REQUIREMENTS

The program in General Education establishes the foundation for a lifetime of intellectual discovery, personal development, and community service while preparing students for advanced work in various professional disciplines and fields of knowledge.

Courses meeting the General Education requirements introduce students to the disciplines of intellectual inquiry and promote respect for moral values and aesthetic experience. Students further develop an understanding of the human mind and spirit, a sense of history and the duties of citizenship, and the workings of society and the world around us.

General Education in the basic fields of knowledge encourages mastery of fundamentals, versatility of mind, motivation for learning, intellectual discipline, and self-reliance. Development of these skills enables ethical and responsible participation in a democratic society and constitutes the best preparation for dealing creatively and constructively with the issues and opportunities of our time.

### MATHEMATICAL SCIENCES

**Rationale**

A logical approach to problem solving is important for successful functioning in society and should include the abilities to formulate models, be critical consumers of quantitative information, communicate mathematically and solve problems.

The study of mathematical sciences will enable the student to:

1. Improve and refine problem-solving abilities including the ability to use the processes of mathematical modeling to bring abstract reasoning to bear on real-world problems. Students learn to formulate problems from real-world

situations, move from problems to mathematical models such as graphs or equations, and transform a model into a solution.

2. Develop the ability to communicate mathematically. This includes the abilities to:

   a. Follow simple directions given in prose, flow chart form, or depicted pictorially; read and interpret tables, charts and graphs; and follow directions to conduct a mathematical activity or investigation, make conclusions, and write a report that discusses the mathematics of the activity and represents the results in acceptable mathematical notation.

   b. Be able to reduce, tabulate, summarize, analyze, graphically represent, make predictions and draw inferences from presented data arising from real world situations.

3. Demonstrate logical reasoning skills including the ability to distinguish among inductive, deductive, and probabilistic reasoning and to follow, evaluate and construct simple, logical arguments.
4. Build on previously-learned algebraic and geometric concepts and models.
5. Further develop an understanding of the concept and role of functions. This includes the abilities to match functional relationships in real world contexts to mathematical representations; interpret mathematical representations of functional relationships arising in some context back to the original real world situations; and be able to translate among graphical, tabular,and symbolic representations of functions.

## NATURAL SCIENCES

### Rationale

The natural sciences pursue basic questions about the workings of the universe, and the richness, variety and interconnectedness of the world around us. Students today are exposed to an increasing volume of information, from a large variety of sources, in diverse and changing formats. Training in the natural sciences is essential to help students develop skills to distinguish between testable and untestable ideas, recognize scientifically valid tests of theories, and understand how information relates to those tests. By studying the natural sciences, students learn to reason both inductively and deductively, develop and test scientific hypotheses, and understand the value and limitations of scientific studies. The development and application of new technologies require scientifically-literate citizens who can understand technological issues and evaluate the role of science in society's debate of those issues.

Education in the natural sciences will enable the student to:

1. use the methods and processes of science in testing hypotheses, solving problems and making decisions,
2. articulate and make inferences from the major concepts, principles, laws, theories, and responsible applications of science in specific disciplines;
3. recognize the role of science in the interactions of science, technology and society; and
4. cultivate a life-long interest in science.

**Minimum requirements for all curricula (20 hours)**

A total of six courses (20 hours) in the mathematical and natural sciences.

(1) Two courses (6 hours) selected from mathematics, statistics, and logic; one must be a mathematics course.

(2) Three courses (11 hours) from the natural sciences; two from different basic sciences (biology, chemistry, earth sciences and physics); two of the three courses must have a laboratory.

(3) The sixth course (3 hours) selected from any of the mathematical science; natural science; or science, technology and society courses.

## WRITING AND SPEAKING

**Rationale**

Writing and speaking are powerful ways of understanding ourselves and the world we live in. It is through writing and speaking that the various disciplines and professions define the knowledge and methodologies that characterize them. Because these communication arts are central to learning and to engaging in the productive life of a community, students must:

1. learn to use writing and speaking as ways of generating, critiquing, and refining ideas, both their own and those of others;
2. understand and use the conventions and standards governing written and spoken discourse across academic disciplines;
3. develop the critical reading, writing, and speaking abilities necessary for participating effectively in a discipline;
4. develop a repertoire of strategies for addressing the concerns of audiences in the many contexts of contemporary life - academic, professional, and civic.

**Minimum requirement for all curricula (9 hours)**

(1) Two semesters of composition and rhetoric during the freshman year.

(2) One semester from any of the following:

(a) advanced writing,
(b) speech, or
(c) foreign language (FL_ 201 or higher in the student's first foreign language or any FL_ course in a second language).

Meeting these goals requires students to engage in writing and speaking across the curriculum. To this end, communications requirements should be integral to all courses used by students to fulfill the humanities and social sciences requirements.

Further, in order that skills develop broadly and consistently along with the individual's increasing knowledge of subject matter, all upper-division courses offered in the university should incorporate a significant communications requirement, and at least one major written paper should be required in every curriculum **in both** the junior and senior years.

## HUMANITIES AND SOCIAL SCIENCES

### Rationale

The humanities and the social sciences comprise the subjects and disciplines that use various modes of rational inquiry to understand human nature and experience, organization and change in human societies, the nature of the world, and rational inquiry itself. An education in the humanities and social sciences requires reading significant works, gaining an exposure to a variety of methodologies, and learning to apply these in written exposition. An education in the basic humanistic disciplines is a necessary part of being truly educated - of becoming a citizen with a broad knowledge of human cultures and with well-considered moral, philosophical, aesthetic, and intellectual convictions.

The goal of general education in the humanities and social sciences is to give the students the foundations for an understanding of:

1. the cultural and linguistic traditions of their own and other societies,
2. the past and the action of historical processes,
3. the application scientific methods to the study of human behavior and mental processes,both individual and collective,
4. ethical choices and the issues of human values they entail, and how to make those choices with intellectual rigor and clarity,
5. the aesthetic, personal, and cultural significance of works of art and,
6. various disciplines as modes of inquiry with distinctive purposes and intellectual processes; and the ability to:

distinguish degrees of plausibility and verification, by critically examining both evidence and logic and,
read analytically (i.e, to reconstruct arguments and consider implications) and interpretatively (i.e, to grasp meaning by being sensitive to the ways in which meaning is generated), as well as to acquire information.

**Minimum requirements for all curricula (21 hours)**

Courses should be selected from among offerings in the basic disciplines of knowledge in Humanities and Social Sciences. Courses aimed at developing specific skills or techniques may not be used to fulfill these requirements. The general education requirements in the Humanities and Social Sciences consist of 21 hours designed to expose students to content areas that demonstrate relevant modes of inquiry:

(1) Two courses or the equivalent in the study of history and/or literature (6 hours).

The study of history contributes to an understanding of continuities and changes in human thought and behavior and of the ongoing process in which individuals shape and are shaped by their societies. Studying historical processes provides training in analysis and interpretation and the evaluation of a wide variety of evidence.

The study of world, national and ethnic literatures, linguistics, film, and folklore addresses essential academic and humanistic goals. These goals include learning analytical skills, enhancing reading and writing competence, exploring human relations, and developing aesthetic sensitivity.

(2) One course, or the equivalent, in the study of philosophy, religion, or the visual and performing arts (3 hours).

In the study of philosophy, students are exposed to the rigorous procedures of philosophical argumentation concerning the nature of knowledge, the existence and nature of objects of many sorts, the foundations of the sciences, and the rich area of ethical reasoning.

In the study of religion, students are introduced to the basic teachings, practices and historical development of the major Eastern and Western religious traditions, as well as to methods of interpretation and techniques of critical thinking in the study of sacred texts.

The visual and performing arts develop students' aesthetic sensitivities, critical judgment, and personal creativity. They also provide students with an understanding of the cultural and historical dimensions of artistic expression.

(3) Two courses, or the equivalent, from different content areas, in the study of psychology, economics, politics and government, sociology, anthropology and cultural geography. (6 hours).

The study of these subjects helps students to understand individual and collective human behavior and mental processes through use of scientific methods.

(4) Two additional courses selected within Humanities and Social Sciences (6 hours).

These hours are to be used to pursue specific interests, to provide additional breadth or to develop depth by taking an introductory and an advanced course in the same area of knowledge.

(5) Among the courses selected to fulfill the Humanities and Social Sciences requirement, at least one must focus on a non-English speaking culture.

## FOREIGN LANGUAGE

### Rationale

Languages are keys to the world. Studying foreign languages, literatures and cultures sharpens students international awareness, and deepens their understanding of how people think, view the world, express themselves, and communicate with one another.

Language learning also expands our ability to create and discover new meaning in our own language and culture. Students who know the linguistic structures of a second language understand their own language better; by grappling with cultural differences, they come to know their own culture more keenly.

The valuable cross-cultural communication skills students gain from foreign language study broaden their perspective on the world, preparing them not only to face the challenges of today's increasingly diverse workplace and global society, but also to thrive in the truly international environment of the 21st century.

### Minimum requirements for all curricula (0 hours)

(1) Two years of high school foreign language be required as a prerequisite for admission to the university.

(2) Foreign language proficiency at the FL_ 102 level be required for graduation.

## PHYSICAL EDUCATION

### Rationale

Essential to a university student's development are attitudes and skills for healthy life-styles. In addition to maintaining fitness, participation in team and individual physical activity significantly reduces major health risks.

Goals for students in physical education include:

1. learning the fundamentals of cardiovascular and strength development and applying this knowledge in the initiation and/or continuation of personal fitness programs,
2. acquiring the basic skills of several lifetime sports or activities and enhancing their proficiencies in these skills so that they will continue to participate throughout life,
3. gaining a working knowledge of the rules, strategies, and safety aspects of several sports or activities,
4. reducing stress from the academic rigors of their other courses, and
5. improving their general physical, social, and mental well-being while learning, participating, and having fun.

### Minimum requirements for all curricula (2 hours)

Two credit hours, one credit each, in physical education.

(1) This requirement includes one Fitness and Wellness course.

(2) All courses will be available on an S/U basis.

## SCIENCE, TECHNOLOGY AND SOCIETY

### Rationale

North Carolina State University, as a land grant university, has a mission that stresses the application of science and technology for the betterment of humankind. It is essential, therefore, that students be exposed to the vital interactions among science, technology, society and the quality of life.

Goals for students completing the Science, Technology and Society requirement include:

1. developing an understanding of the influence of science and technology on civilizations,
2. developing the ability to respond critically to scientific and technological issues in civic affairs, and
3. understanding the interactions among science, technology and values.

**Minimum requirement for all curricula (3 hours)**

Courses which satisfy this requirement can be oriented toward science and technology or toward the humanities and social sciences. This course can also partially satisfy either the humanities and social sciences requirement or the mathematical and natural sciences requirement (# 3) but not both. Students with majors in science and technology should study this topic from a humanities and social sciences perspective and those students in the humanities and social sciences should select courses oriented toward science and technology. This requirement can be satisfied by an interdisciplinary course designed to cover both perspectives.

## COMMUNICATION AND INFORMATION TECHNOLOGY
## COMPUTER LITERACY

**Rationale**

Today's graduate must have a knowledge of information technology and computer applications. Every student needs a basic understanding of information processing. It is not necessary that every student be a programmer.

Students should develop and demonstrate proficiency in the use of computers, learning to use applications such as word processing, spreadsheets, database management programs, electronic mail, and packages and applications specific to their field of study.

**Minimum requirement for all curricula (0 hours)**

The following may be used to fulfill computer technology instruction:

(1) instruction and assignments required within courses, and/or

(2) required use of a computer to complete assignments.

## LIBRARY/INFORMATION

**Rationale**

The demands of an increasingly technological and information-dependent society require that students have a basic understanding of how information is identified and defined by experts, structured, physically organized, and accessed.

Proficiency is best gained by requiring the use of information resources to complete an assignment, or to create a bibliography from which a paper or speech is developed. Information retrieval instruction beyond that provided in freshman English could be connected with writing and speaking requirements and/or it could be taught by requiring assignments involving substantial use of library resources.

Academic units are encouraged to work closely with library staff for the development and delivery of instruction and experience in information retrieval techniques.

**Minimum requirement for all curricula (0 hours)**

The following may be used to fulfill information retrieval instruction:

(1) use of one or more class periods to teach the structure of information, and to provide experience using major information resources,
(2) use of self-paced printed instructional materials,
(3) use of computer-based instructional materials,
(4) development of an information-based assignment requiring use of library resources, and/or
(5) other methods as appropriate for the discipline.

## FREE ELECTIVES

All schools and colleges are encouraged to include free electives in their curricula to satisfy their educational objectives. Moreover, students who would like to take courses beyond those required for their degree are encouraged to do so.

## TOTAL HOURS

Minimum credit hours required in an baccalaureate curriculum that has not been designated a five-year program range from 120 to 128.

## GRADUATION REQUIREMENTS

Students are eligible for graduation when they have completed satisfactorily all the academic requirements of their degree program as specified by their major department, their college, and the university.

NC State requires that, in addition to other university, college, and departmental requirements, all students must have a grade point average of at least 2.000, based on all courses attempted at NC State, in order to be eligible to receive a baccalaureate degree.

**Minimum Hours Required for Graduation** - These are shown for each curriculum and range from 120 to 128. Students may take more hours than the required minimum.

**Length of Time to Graduation** - The normal and expected length of time to graduation is four years (eight semesters) provided the student completes an average of slightly more than 16 credit hours each semester (for most curricula) or attends one or more summer sessions.

In order to make continuous progress toward graduation, students are encouraged to take full advantage of the university's advising and support services. Effective career decision-making and early, deliberate, long-range semester-by-semester planning of courses and careful selection of extra-curricular commitments can provide direction and motivation necessary for effective use of time to graduation. Additional factors that may assure a student's continuous progress toward graduation include (1) good academic performance in freshman and basic prerequisite courses, (2) advanced placement for introductory courses, and (3) enrollment in summer sessions.

Students are discouraged from taking unrealistic course loads as a means to accelerate their progress toward graduation as this may result in poor academic performance.

Students may take more than eight semesters to complete an undergraduate program at NC State. In some cases this is the result of effective decision-making on the part of the student for such things as (1) participation in cooperative education or study abroad programs, (2) a decision to be a part-time student with a reduced course load for reasons of health, necessary outside employment, or parental responsibilities, or (3) attempting dual degrees, double majors, or academic minors. In other cases the length of time to graduation may be prolonged beyond the eighth semester as a result of (4) incomplete or inadequate secondary school background requiring some additional compensatory, developmental, or prerequisite courses, (5) poor academic performance in the freshman year or early semesters, or (6) late changes of curriculum.

**Semester-by-Semester Displays** - The requirements for many curricula throughout this section are set forth in semester-by-semester displays. One purpose for these displays is to illustrate how certain sequences of courses and prerequisites may be scheduled. Another purpose is to reflect whether courses are normally offered in the fall or the spring semester. Otherwise, the semester-by-semester displays are merely advisory and not mandatory. The typical semester schedule shown in the displays

may not be the appropriate one for many students. Students are required to consult with their faculty advisers prior to registration each semester.

**Limited D Grades** - Some colleges and departments have established limitations on the use of D grades in certain courses or categories of courses for satisfying graduation requirements.

**Grade Point Average in Major** - Some departments have established graduation requirements of a grade point average of 2.000 on all courses attempted in the major at NC State or a "C" or better in some or all major courses. Such a requirement is in addition to the university grade point average requirement of 2.000 for all courses attempted at NC State. Students are encouraged to inquire about specific requirements in majors of interest.

**Residence Requirements** - To be eligible for a bachelor's degree, a student must be enrolled in a degree program at NC State, must have completed at least 25 percent of credit hours required for graduation through courses offered by NC State, and must have earned at least 30 of the last 45 hours of credit through NC State courses. In no case shall the proportion of credit hours taken at NC State and applied towards a bachelor's degree be less than 25 percent. Individual departments and/or colleges may have additional residence requirements.

*Note: The College of Engineering has a policy that transfer students normally must earn at least 48 of their last 60 hours of credit at NC State while enrolled as degree candidates.*

*Note: The College of Management has a policy that Accounting and Business Management majors normally must earn at least 30 credit hours while officially enrolled as a degree candidate in either the ACC or BUS curriculum.*

## MINORS

Some departments at NC State offer undergraduate minors for students wishing a systematic program of study in an area outside their major. All minors require at least 15 credit hours and may be either departmental or interdepartmental. Courses within the minor program may be used to satisfy any of the general requirements, including free electives, of a major curriculum. Minors are completely optional, the only requirement being that a student may not minor in the same discipline as their major. Students pursuing a minor must consult with a minor adviser on a plan of work and must file a copy of this plan with their major adviser at least one semester before graduation. Satisfactory completion of the minor will be noted on the final transcript following graduation. (See "Academic Fields of Study and Degrees" in this catalog for a listing of available minors.)

## TWO DEGREES

Students who have satisfactorily completed the requirements for more than one bachelor's degree may, upon the recommendation of their deans, be awarded two bachelor's degrees at the same or at different commencement exercises. To earn two degrees students register in one school or department and, with the cooperation of the second school or department, work out their program to cover the requirements for both. Students must file an approved Double Majors Only Curriculum Change Form with Registration and Records, 1000 Harris Hall. An Application for Degree Form must be submitted for each degree.

## TRANSCRIPTS OF ACADEMIC RECORD

A transcript is an exact copy of a student's permanent academic record at the time it is issued. A fee of five dollars is charged for each transcript.

No official transcript may be issued to or for a student who is indebted to the university until such indebtedness has been paid or satisfactorily adjusted.

Official transcripts are issued only upon the *written* request of the student to Registration and Records, Box 7313, Raleigh, North Carolina 27695-7313.

# COLLEGE OF AGRICULTURE AND LIFE SCIENCES

*Patterson Hall, Room 115*
*NCSU Box 7642*
*Raleigh, NC 27695-7642*

*Phone:* *(919) 515-2614*
*Fax:* *(919) 515-5266*
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D. F. Bateman, *Dean*

J. L. Oblinger, *Associate Dean and Director,* Academic Programs

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B. Oilstone-Mills, *Coordinator,* African-American Students

M. L. Bullock, *Coordinator,* Career Development and Placement Office

K. L. Esbenshade, *Associate Director,* Academic Programs, and *Director,* Agricultural Institute

Academic programs in the college represent a unique blending of the agricultural and life sciences. Agriculture is a very diverse industry that touches everyone's life in some way or another. The life sciences provide foundations for studying medical and health-related disciplines as well as environmental sciences and molecular biology.

The goals of the instructional program in the College of Agriculture and Life Sciences include providing relevant, scientific, and practical knowledge of the food, agricultural, and life sciences to its students. These programs emanate from a highly qualified and accomplished faculty committed to academic excellence and the development of the individuals to their personal and professional potential. Central to the college's goals is the cultivation of interdisciplinary problem-solving skills which will serve its graduates well as they pursue a lifetime of learning and adaptation to change.

The overall objectives of the academic program include the following:

- To provide an opportunity for a broad university education
- To provide a variety of learning experiences

- To offer a choice of specialization in agriculture and life sciences
- To provide background for graduate or professional programs

## STUDENT ACTIVITIES

Students in the College of Agriculture and Life Sciences have numerous opportunities to take part in broadening extracurricular activities. Most departments have student organizations that provide professional as well as social experience. Representatives of these clubs form the Agri-Life Council. This council is the student organization representing the College. Student tours provide an opportunity to see firsthand the application of classroom principles.

In addition, students representing agrimarketing, agronomy, animal science, horticultural science, food science, poultry science and soil science compete regionally and nationally in a number of activities, providing student members a chance to learn by travel as well
as by participation.

## CURRICULUM OFFERINGS AND REQUIREMENTS

A freshman enrolling in Agriculture and Life Sciences has common core courses the first year - courses appropriate in all curricula. This approach allows the student time to explore various programs before selecting a curriculum. The student selects a major in a department or interdisciplinary program.

All departments offer *science* curricula (intended primarily for students who anticipate attending graduate or professional school), several *technology* curricula, and the Agricultural Business Management curriculum is offered in the Department of Agricultural and Resource Economics.

****University Physical Education requirements have been modified. It is recommended that students consult with their adviser on specific curriculum requirements regarding PE.*

## DEPARTMENTAL MAJORS

**Business-** agricultural business management is offered through the Department of Agricultural and Resource Economics. A concentration in biological sciences and the opportunity for double majoring in business and other programs are available.

**Science-** animal science, agricultural and extension education, applied sociology, biochemistry, biological engineering (joint program with the College of Engineering),biological sciences, botany, fisheries and wildlife sciences (joint

program with the College of Forest Resources), food science, horticultural science, medical technology, microbiology, poultry science, and zoology. Pre-professional courses are offered in the science curriculum track.

**Technology** - agricultural and environmental technology, animal science, food science, horticultural science and poultry science.

## INTERDEPARTMENTAL AND INTERDISCIPLINARY PROGRAMS

These curricula offer the opportunity to select broad curriculum majors that involve two or more departments or colleges:

**Agronomy** - A technical curriculum dealing with the fundamentals of crop production and soil management. The curriculum is administered by the Departments of Crop Science and Soil Science.

**Biological Sciences** - A curriculum with emphasis on biological and physical sciences, especially designed for graduate or professional courses requiring a biology background.

**Environmental Sciences** - A curriculum concerned with the development of new and more efficient ways to maintain and enhance the world's environments for society's benefit including ecological, technical and economic approaches. The curriculum is administered jointly by the College of Agriculture and Life Sciences and the College of Physical and Mathematical Sciences.

**Natural Resources** - A curriculum concentrating on the use, management and improvement of natural resources. The curriculum is administered jointly by the College of Agriculture and Life Sciences, the College of Forest Resources and the College of Physical and Mathematical Sciences.

In addition to these cited curricula, a number of arrangements are available that provide the student an opportunity to select areas of course concentration.

## ACADEMIC MINORS

Several departments in the College of Agriculture and Life Sciences offer a minor in their discipline. Students interested in additional information regarding a minor should contact the appropriate departmental office. At present, the following minors are available:

| Minor | Department |
|---|---|
| Agricultural Business Management | Agricultural and Resource Economics |
| Animal Science | Animal Science |
| Applied Sociology | Sociology and Anthropology |
| Biological Sciences | Biological Sciences |
| Botany | Botany |
| Entomology | Entomology |
| Food Science | Food Science |
| Genetics | Genetics |
| Horticultural Science | Horticultural Science |
| Microbiology | Microbiology |
| Nutrition | Food Science |
| Poultry Science | Poultry Science |
| Soil Science | Soil Science |
| Zoology | Zoology |

## HONORS PROGRAM

The College of Agriculture and Life Sciences has a comprehensive honors program for qualified students throughout their academic careers. Both seminar discussion programs covering broad topics and an independent research program are included. Faculty provide direction on an individual basis to each student with the students selecting their projects.

Participation in CALS Honors Program is limited to CALS students with a GPA of 3.250 or above. The following ALS courses, 299H, 498H, 499H, are required. In addition, a student must take at least six hours of honors course work (at least 3 credits outside CALS) or participate in the University Scholars Program for at least two semesters. Honors course work must be completed with a "C" or better.

## JOINT COLLEGE HONOR'S PROGRAM

The Department of Biochemistry's Honors Program, which is administered through the College of Agriculture and Life Sciences and the College of Physical and Mathematical Sciences, is designed to encourage excellent undergraduate biochemistry majors to develop their academic potential through a selection of courses and research that will challenge their abilities and better prepare them for postgraduate careers.

To be admitted to this program, a student must have at least a 3.500 overall GPA, including grades B or better in calculus (MA 141,241,242), general chemistry (CH 101,107,121,127), organic chemistry (CH 221,223), and calculus-based physics (PY 205,208). To complete the program, the student must take two semesters of physical

chemistry (CH 431,433), and earn at least three credit hours in biochemically-related research. A written scientific report based on the student's research is required. A minimum of 9 credit hours must be drawn from at least two of the following three categories:

- designated Honors courses, such as BCH 454H
- advanced courses, such as 500-level courses in related fields
- research, such as BCH 492, BCH 493, or ALS 498H and 499H.

## HONOR SOCIETIES

Students in all majors with strong academic records are recognized by national organizations that have local chapters, Gamma Sigma Delta, Alpha Zeta, Alpha Epsilon Delta and Phi Kappa Phi.

## SCHOLARSHIP PROGRAM

The College of Agriculture and Life Sciences awards approximately 350 scholarships each year on a combination of selection factors including merit, financial need and leadership.

## JEFFERSON SCHOLARS IN AGRICULTURE/LIFE SCIENCES AND THE HUMANITIES (See College of Humanities and Social Sciences)

The Thomas Jefferson Scholars Program in Agriculture/Life Sciences and the Humanities is a joint program of the College of Agriculture and Life Sciences and the College of Humanities and Social Sciences. It is a double degree which permits participants to have two concentrations: one in an area of agriculture/life sciences and one in an area of humanities/social sciences. The double degree program may be individually designed to meet each student's particular interests and career goals. The purpose of the program is to produce potential leaders in agriculture and the life sciences who have not only technical expertise but also an appreciation for the social, political, and cultural issues that affect decision-making.

Each spring a number of entering freshmen are chosen to receive scholarships to participate in the Jefferson program. In addition, other qualified students may choose to pursue a double major in agriculture/life sciences and the humanities under the Jefferson program.

Students interested in applying to the Jefferson Scholars program should contact either of the following people before January 15.

Dr. James L. Oblinger, *Associate Dean*
College of Agriculture and Life Sciences
NCSU Box 7642
Raleigh, NC 27695
515-2615

Dr. Edward T. Funkhouser, *Assistant Dean*
College of Humanities and Social Sciences
NCSU Box 8101
Raleigh, NC 27695
515-2467

## INTERNATIONAL STUDIES

An international seminar is offered to interested students. In addition, an international option, requiring a modern foreign language and 12 semester hours of appropriate courses in the social sciences, is available for students enrolled in any curricula.

## DEGREES

The Bachelor of Science degree is conferred upon the satisfactory completion of one of the curricula in this college.

The degrees of Master of Science, Master of Agriculture and Master of Life Sciences are offered in the various departments in the college.

The Doctor of Philosophy degree is offered in the following subject areas: animal science, biochemistry, biological and agricultural engineering, botany, crop science, economics, entomology, food science, genetics, horticultural science, microbiology, nutrition, physiology, plant pathology, sociology, soil science, toxicology, and zoology.

Further information on graduate offerings may be found in the *Graduate Catalog.*

## CAREER OPPORTUNITIES

A diversity of careers are available in agriculture and the life sciences. Areas pursued by graduates includes:

*Professional and Graduate Education* - The college provides pre-professional programs at the undergraduate level for medical, dental, optometry, pharmacy and veterinary medicine. Many of our graduates pursue advanced degrees including a Masters or Doctor of Philosophy in a variety of disciplines.

*Research*- Medical; biological; agricultural; environment; processing; economics; marketing.

*Agricultural/Horticultural Production* - Livestock; poultry; aquaculture; fruits; vegetables; ornamentals; turfgrass.

*Business and Industry* - Banking; real estate/farm appraising; technical sales; farm management; marketing; retail management; manufacturing; processing.

*Environmental/Natural Resources* - Soil; water; forest; fish and wildlife; ecology and education.

*Education/Government* - High school and college instruction in agriculture and life sciences; agricultural education; extension agents; research associates.

*Services* - Inspection and regulation; environmental testing; product grading; consulting.

The College has a Career Development and Placement Office, located in 111 Patterson Hall. For additional information, contact the Coordinator, Marcy Bullock, 515-3249.

## FRESHMAN YEAR

The curricula in the College of Agriculture and Life Sciences have a common freshman year with the exception of the science program offered through the Department of Biological and Agricultural Engineering. For the freshman year of that curriculum, see the College of Engineering.

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics to ALS | 1 |
| BIO 125 General Biology *or* | |
| CH 101 General Chemistry I *and* | |
| CH 121 General Chemistry I Lab[1] | 4 |
| ENG 111 Comp. and Rhetoric | 3 |
| MA 107 Precalculus[1] | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| Humanities/Soc. Sci. Elective | 3 |
| (Military Science or Air Science may be elected) | |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| BIO 125 General Biology *or* | |
| CH 101 General Chemistry I *and* | |
| CH 121 General Chemistry I Lab *or* | |
| CH 107 General Chemistry II *and* | |
| CH 127 General Chemistry II Lab | 4 |
| ENG 112 Comp. and Reading | 3 |
| MA 114 Intro.to Finite Math. with Appl. *or* | |
| MA 131 Analytic Geom. & Calculus A | 3-4 |
| Humanities/Soc. Sci. Elective | 3 |
| Physical Education Elective | 1 |
| (Military Science or Air Science may be elected) | |
| | 14-15 |

[1]Both biology and chemistry are required for all ALS curricula.

[2]Does not contribute to the total semester hours required for graduation in certain curricula. Consult departmental faculty adviser.

## A B C ELECTIVES

The following lists provide typical courses that may be selected from each of the three groups. Group A includes the physical and biological sciences; Group B, economics and business; and Group C, applied science and technology. Other appropriate courses may be selected by checking with the Office of the Director of Academic Programs.

## *Group A*
## PHYSICAL AND BIOLOGICAL SCIENCES

*Animal Science*

ANS 130 Anatomy and Physiology of Domestic Animals
ANS (HS) 215 Basic Agricultural Genetics
ANS 220 Reproduction, Lactation and Behavior of Domestic Animals
ANS 230 Nutrition and Growth of Domestic Animals
ANS (NTR,PO) 415 Comparative Nutrition
ANS (NTR) 419 Human Nutrition in Health and Disease

*Biochemistry*†

BCH 150 Introductory Biochemical Concepts
BCH 451 Introductory Biochemistry
BCH 452 Introductory Biochemistry Lab
BCH453 Intro.toMolecular Biology and Metabolism
BCH 454 Advanced Biochemistry Lab

*Biological and Agricultural Engineering*

BAE 303 Energy Conversion in Biological Systems

*Biological Sciences*

All courses listed with the BIO designation.

*Botany*

BO 200 Plant Life
BO 213 Plants and Civilization
BO 220 Local Flora
BO 360 Intro. to Ecology
BO 365 Ecology Lab
BO 400 Plant Diversity
BO 403 Systematic Botany
BO 413 Introductory Plant Anatomy
BO (ZO) 414 Cell Biology
BO 421 Plant Physiology
BO 480 Intro. to Plant Biotechnology

*Chemistry*†

Appropriate Courses

*Computer Science*†

Appropriate Courses

*Entomology*

ENT (FOR) 402 Intro. to Forest Entomology
ENT (ZO) 425 General Entomology

*Fisheries-Wildlife*

FW (FOR) 404 Forest Wildlife Management
FW (ZO) 420 Fishery Science

*Food Science*

FS 231 Food Engineering
FS 402 Food Chemistry
FS 403 Food Analysis
FS (MB) 405 Food Microbiology

*Forestry*

FOR (ENT) 402 Forest Entomology
FOR (FW) 404 Forest Wildlife Entomology

*Genetics*

GN 411 Principles of Genetics
GN 412 Elementary Genetics Lab

*Horticultural Science*

HS (ANS) 215 Basic Agricultural Genetics

*Marine, Earth and Atmospheric Sciences*†

Appropriate Courses

*Mathematics*†

Appropriate Courses

*Microbiology*

MB 200 Microbiology and World Affairs
MB 351 General Microbiology
MB (FS) 405 Food Microbiology
MB 411 Medical Microbiology
MB 414 Microbial Metabolic Regulation

*Nutrition*

NTR (ANS,PO) 415 Comparative Nutrition
NTR (ANS) 419 Human Nutrition in Health and Disease

*Physics*†

Appropriate Courses

*Poultry Science*

PO 405 Avian Physiology
PO (ANS,NTR) 415 Comparative Nutrition

*Soil Science*†

SSC 200 Soil Science

*Statistics*†

Appropriate Courses

*Zoology*

ZO 201 General Zoology
ZO 205 Intro. to Cellular and Developmental Zoology
ZO 208 Intro.toOrganismal and Evolutionary Zoology
ZO 212 Basic Anatomy and Physiology
ZO (MEA) 220 Marine Biology
ZO 303 Vertebrate Zoology
ZO 304 Vertebrate Zoology Lab
ZO 305 Cellular and Animal Physiology Lab
ZO 315 General Parasitology
ZO 361 Principles of Embryonic Development
ZO 370 Developmental Anatomy and Histology of the Vertebrates I
ZO 371 Developmental Anatomy and Histology of the Vertebrates II
ZO 375 Developmental Anatomy and Histology Lab I
ZO 376 Developmental Anatomy and Histology Lab II
ZO 402 Invertebrate Zoology
ZO 403 Invertebrate Zoology Lab
ZO 410 Intro. to Animal Behavior
ZO (BO) 414 Cell Biology
ZO (FW) 420 Fishery Science
ZO 421 Principles of Physiology
ZO 422 Biological Clocks
ZO (ENT) 425 General Entomology
ZO 441 Biology of Fishes
ZO 442 Biology of Fishes Lab
ZO 450 Evolutionary Biology
ZO 460 Aquatic Natural History Lab
ZO 480 Lab Techniques in Cellular Biology

†Courses in these blocks are considered Physical Sciences.

*Group B*

**ECONOMICS AND BUSINESS**

*Accounting*

ACC 100 Intro. to Accounting
ACC 210 Accounting I - Concepts of Financial Reporting
ACC 220 Accounting II - Intro. to Managerial Accounting
ACC 280 Managerial Uses of Cost Data
ACC 300 Professional Accounting Environment
ACC 310 Intermediate Financial Accounting I
ACC 311 Intermediate Financial Accounting II
ACC 320 Managerial Uses of Cost Data
ACC 330 An Intro. to Income Taxation
ACC 410 Advanced Financial Accounting
ACC 440 Accounting Information Systems
ACC 450 Auditing Financial Information Practice

*Agricultural and Resources Economics*

ARE 303 Farm Bus. Management
ARE 306 Agricultural Law
ARE 312 Agribusiness Marketing
ARE 321 Agricultural Financial Management

ARE 403 Economics of Consumer Decisions
ARE 423 Futures and Options Markets
ARE 433 U.S. Agricultural Policy

*Business Management*

BUS 307 Bus. Law I
BUS (EC) 310 Managerial Economics
BUS 320 Financial Management
BUS 330 Human Resource Management
BUS 346 International Bus.
BUS (ST) 350 Economics and Bus. Statistics
BUS 360 Marketing Methods
BUS 405 Regulatory Law
BUS 407 Bus. Law II
BUS 420 Financial Management of Corporations
BUS 422 Investments and Portfolio Management
BUS 432 Industrial Relations
BUS 455 Quantitative Methods for Management
BUS 462 Marketing Research
BUS 465 Advertising and Promotion Management
BUS (TAM) 482 Textile Marketing Management
BUS (WPS) 485 Management Development Seminar

*Economics*

EC (BUS) 310 Managerial Economics
EC 451 Intro. to Econometrics

*Mathematics*

MA 105 Mathematics of Finance

*Statistics*

ST (BUS) 350 Economics and Bus. Statistics

*Group C*

**APPLIED SCIENCE AND TECHNOLOGY**

*Agricultural and Extension Education*

AEE 311 Comm. Methods and Media
AEE 470 Agricultural Communications

*Animal Science*

ANS 100 Perspectives in Animal Science
ANS 200 Intro. to Animal Science
ANS 201 Techniques of Animal Care
ANS 202 Techniques of Horse Care
ANS 210 Microcomputers in Animal Production
ANS 250 Applied Animal Nutrition
ANS 300 Animal Production Field Study Trip
ANS (FS,NTR) 301 Intro. to Human Nutrition
ANS 303 Principles of Equine Evaluation
ANS 308 Advanced Livestock Judging
ANS 310 Basic Horse Husbandry
ANS (FS,PO) 322 Muscle Foods and Eggs
ANS (FS) 324 Milk and Dairy Products
ANS 340 Selection of Domestic Animals
ANS 402 Beef Cattle Management
ANS 403 Swine Management
ANS 404 Dairy Cattle Management
ANS 406 Sheep Management
ANS 410 Equine Management
ANS 412 Applied Animal Breeding
ANS (PO) 425 Feed Mill Management and Feed Formulation

*Biological and Agricultural Engineering*

BAE 101 Intro. to Biological Engineering and Computing
BAE 121 Computer Applications in Agric. and Life Sci. Applications
BAE 151 Elements of Biological and Agricultural Engineering I
BAE 201 Shop Processes and Management
BAE 252 Elements of Biological and Agricultural Engineering II
BAE 311 Agricultural Machinery and Power Units
BAE (SSC) 323 Water Management
BAE (SSC) 324 Elementary Surveying
BAE 332 Animal Facilities & Environmental Management
BAE 333 Processing Agricultural Products
BAE 342 Agricultural Processing
BAE 343 Agricultural Electrification
BAE 344 Circuits and Controls
BAE 411 Farm Power and Machinery
BAE 432 Agricultural & Environmental Safety & Health
BAE 442 Systems Approach to Agricultural & Environmental Issues
BAE 451 Engineering Design I
BAE 452 Engineering Design II
BAE 462 Machinery Design and Applications
BAE 471 Soil and Water Engineering
BAE 473 Intro. to Surface/Water Quality Modeling
BAE 481 Agricultural Structures and Environment

*Crop Science*

CS 200 Intro. to Turfgrass Management
CS 213 Crops: Adaptation and Production
CS 312 Pastures and Forage Crops
CS 316 Soybean Production
CS 317 Corn Production
CS 318 Corn and Soybean Production
CS 400 Turf Cultural Systems
CS 411 Environmental Aspects of Crop Production
CS 413 Plant Breeding
CS 414 Weed Science
CS 415 Agronomic Pest Management Systems
CS (SSC) 462 Soil-Crop Management Systems

*Entomology*

ENT 203 Intro. to the Honey Bee and Beekeeping

*Fisheries and Wildlife Sciences*

FW (ZO) 221 Conservation of Natural Resources
FW (FOR) 310 Fisheries and Wildlife Inventory and Management
FW (ZO) 353 Wildlife Management

FW (ZO) 430 Fisheries-Wildlife Administration
FW 485 Natural Resources Advocacy

*Food Science*

FS 201 Food Science and the Consumer
FS (ANS,NTR) 301 Intro. to Human Nutrition
FS (ANS,PO) 322 Muscle Foods and Eggs
FS (ANS) 324 Milk and Dairy Products
FS 400 Principles of Human Nutrition
FS 416 Quality Control of Food Products
FS 421 Food Preservation
FS 425 Processing Dairy Products

FS (HS) 462 Postharvest Physiology

*Horticultural Science*

HS 100 Home Horticulture
HS 101 Plants for Home and Pleasure
HS 201 Principles of Horticulture
HS 211 Ornamental Plants I
HS 212 Ornamental Plants II
HS 301 Plant Propagation
HS 342 Landscape Horticulture
HS 371 Interior Plantscapes
HS 400 Residential Landscaping
HS 411 Nursery Management
HS 416 Principles of Ornamental Planting Design
HS 421 Tree Fruit Production
HS 422 Small Fruit Production
HS 431 Vegetable Production
HS 440 Greenhouse Management
HS 441 Floriculture I
HS 442 Floriculture II
HS (FS) 462 Postharvest Physiology
HS 471 Tree and Ground Maintenance

*Nutrition*

NTR (ANS,FS) 301 Intro. to Human Nutrition

*Plant Pathology*

PP 315 Principles of Plant Pathology
PP (FOR) 318 Forest Pathology

*Poultry Science*

PO 201 Poultry Science and Production
PO 301 Evaluation of Live Poultry
PO (ANS, FS) 322 Muscle Foods and Eggs
PO 351 Grading and Evaluation of Poultry Products
PO 410 Production and Management of Game Birds in Confinement
PO 420 Turkey Production
PO 421 Commercial Egg Production
PO 422 Incubation and Hatchery Management
PO 423 Broiler Production
PO 430 Poultry Breeding
PO (ANS) 425 Feed Mill Management and Feed Formulation

*Soil Science*

SSC (BAE) 323 Water Management
SSC (BAE) 324 Elementary Surveying
SSC 341 Soil Fertility and Fertilizers
SSC 342 Soil Fertility Lab
SSC 361 Non-Agricultural Land Use and Management
SSC 370 Sustainable Agriculture
SSC 452 Soil Classification
SSC 461 Soil Physical Properties and Plant Growth
SSC (CS) 462 Soil-Crop Management Systems
SSC 472 Forest Soils

*Veterinary Science*

VMF 401 Poultry Diseases
VMF 420 Diseases of Farm Animals

*Zoology*

ZO (FW) 221 Conservation of Natural Resources
ZO (FW) 353 Wildlife Management
ZO 419 Limnology
ZO (FW) 430 Fisheries-Wildlife Administration

# DEPARTMENT OF AGRICULTURAL AND EXTENSION EDUCATION

Ricks Hall, Room 120

R. W. Shearon, *Head and Assistant Director,* Cooperative Extension Service

J. L. Flowers, *Undergraduate Coordinator*, and *Director,* Graduate Programs and Agricultural and Extension Education

R. T. Liles, *Associate Head* and *Department Extension Leader*

**Teaching, Research and Extension Faculty**

*Professors:* G. W. Bostick, D. M. Jenkins, G. E. Moore, R. D. Mustian; *Associate Professors*: L. R. Jewell, B. M. Kirby; *Extension Specialists-Educational Programs*: J. G. Richardson, B. G. Watts

For more information call (919) 515-2241.

Agricultural and Extension Education is a broad field of study and practice representing the blending of agricultural and behavioral sciences into educational programs for youth and adults. Agriculture impacts everyone's life in terms of food, water, air, clothing, homes and the quality of life. Central to the department's goals is the formal and nonformal teaching of problem-solving and learning skills for a lifetime of growing, evolving, and changing.

Numerous professional improvement opportunities are available to people participating in departmental programs. Graduates have the choice to plan for teaching, administrative leadership and public relations positions in secondary schools, community colleges, Cooperative Extension and, universities and agribusinesses. Graduates are highly qualified in agricultural and extension education and career placement assistance is provided all graduates.

## CURRICULA

Agricultural education encompasses areas of study which will enable one to participate effectively in planning, promoting, and initiating educational programs in agriculture. The program leads to a Bachelor of Science degree and is designed to prepare teachers of agriculture for secondary schools and, community and technical colleges. The demand for agricultural education teachers exceeds present supply. in the Carolinas, Virginia, and throughout the nation.

The Agricultural Education/Agricultural Extension curriculum is designed to prepare individuals for careers in the extension service. It is offered as a program track under the Bachelor of Science degree in Agricultural and Extension Education. Students are required to complete both classroom and laboratory studies on the North Carolina State University campus and a closely supervised practicum in the field. A 45-hour field work experience in an extension office during the sophomore year and a full-semester practicum experience in an extension office or agriculture-related industry during the senior year is required.

The Agricultural Education/Communication Concentration is designed to prepare individuals for careers in professions related to communications in agriculture. It is offered as a concentration under the Bachelor of Science degree in Agricultural and Extension Education. Students are required to complete both classroom and laboratory studies on the North Carolina State University campus and a closely supervised practicum in the field. A 45-hour field work experience in an agricultural industry during the sophomore year and a full-semester practicum experience in an agricultural-related industry during the senior year are required.

## CURRICULUM IN AGRICULTURAL AND EXTENSION EDUCATION, TEACHER CERTIFICATION OPTION

### Degree earned: B.S. in Agricultural and Extension Education

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Into. Topics in ALS | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| EOE 101 Intro.to Occupational Education. | 1 |
| Comm./Speech Elective[1] | 3 |
| History Elective[2] | 3 |
| Math Elective[3] | 3 |
| Any 100-level PE in Fitness & Wellness[4] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| AEE (ED) 226 Instr. Technology for Agric. Ed. | 3 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. and Reading | 3 |
| Math Elective[3] | 3 |
| Sci., Technology, Soc. Requirement[5] | 3 |
| Physical Education Elective | 1 |
| | 17 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| AEE (ED) 206 Intro. to Teach Agric. | 3 |
| ARE 201 Intro. to Agric. & Res. Economics *or* | |
| EC 201 Economics I | 3 |
| BAE 201 Shop Processes & Mgmt. | 3 |
| Agricultural Concentration[6] | 4 |
| Chemistry Elective[7] | 4 |
| Physical Education Elective | 1 |
| | 18 |

| *Spring Semester* | *Credits* |
|---|---|
| FOR 110 Intro. to Forestry *or* | |
| FOR 252 Intro. to Forest Science | 2-3 |
| Agricultural Concentration[6] | 4 |
| Agricultural Concentration[6] | 4 |
| Humanities/Soc.Sci. Elective[8] | 3 |
| Literature Elective[9] | 3 |
| Physical Education Elective | 1 |
| | 17-18 |

## JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| AEE (ED) 322 Exper. Learn in Agric. | 2 |
| ED 310 Tutoring Adolescents | 1 |
| PSY 304 Educational Psychology | 3 |
| SSC 200 Soil Science | 4 |
| Agricultural Concentration[6] | 3 |
| Plant Science Elective[10] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| AEE 323 Leadership Dev. in Agric. | 2 |
| ELP 344 School and Society | 3 |
| PSY 376 Developmental Psych. or PSY 476 Psych. of Adolescent Dev. | 3 |
| SOC 305 Racial & Ethnic Relations | 3 |
| Agricultural Concentration[6] | 3 |
| Phil., Relig., Visual/Perform. Arts Elective.[11] | 3 |
| | 17 |

## SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| AEE (ED) 426 Methods of Teaching Agric. | 3 |
| ECI 451 Teaching Sec. School Reading | 2 |
| Agricultural Concentration[6] | 6 |
| Free Electives | 6 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| AEE (ED) 424 Planning Educational Prog. | 3 |
| AEE (ED) 427 Student Teaching in Agric. | 8 |
| AEE (ED) 492 Senior Sem. in Agric. Education. | 1 |
| | 12 |

Minimum Hours Required for Graduation ..... 126-128*

*Note. Students must have demonstrated foreign language proficiency at the FL_ 102 level.

[1] Select from approved communication/speech electives.
[2] Select history (HI) courses from the history elective list.
[3] Mathematical sciences elective list. One course must be a math course.
[4] The first two PE credits do not count toward graduation.
[5] Select the approved science, technology, and society course for the concentration.
[6] These courses must be selected from one of the approved concentrations.
[7] Select a chemistry course from the approved natural sciences courses.
[8] Select from the approved list of humanities and social sciences courses. Must focus on a non-english speaking culture.
[9] Select from approved literature electives.
[10] Select from courses in botany, crop science, forestry or horticulture.
[11] Select from the approved list of philosophy, religion, and visual & performing arts courses.

## AGRICULTURAL AND EXTENSION EDUCATION CONCENTRATIONS

Animal Science Concentration ..... (24 hrs)
- ZO 201 General Zoology ..... (4)
- ANS 200 Intro. to Animal Science ..... (3)
- ANS 201 Techniques in Animal Care ..... (2)
- ANS 250 Applied Animal Nutrition ..... (3)

Select 9 semester hours from:
- ANS 310 Basic Horse Husbandry ..... (3)
- ANS 402 Beef Cattle Management ..... (3)
- ANS 403 Swine Management ..... (3)
- ANS 404 Dairy Cattle Management ..... (3)
- ANS 406 Sheep Management ..... (3)
- ANS 410 Equine Management ..... (3)

Horticultural Science Concentration ..... (23-24 hrs)
- BO 200 Plant Life ..... (4)
- HS 201 Principles of Horticulture ..... (3)
- HS 301 Plant Propagation ..... (4)
- HS 411 Nursery Management *or* HS 440 Greenhouse Management ..... (3)
- HS 421 Tree Fruit Production *or* HS 422 Small Fruit Production *or* HS 431 Vegetable Production ..... (3-4)
- HS 441 Floriculture I *or* HS 442 Floriculture II ..... (3)
- Horticultural Science Elective ..... (3)

Botany Concentration ..... (26 hrs)
- BIO 125 General Biology ..... (4)
- BO 200 Plant Life ..... (4)
- BO 360 Intro. to Ecology ..... (3)
- BO 365 Ecology Lab ..... (1)
- BO 400 Plant Diversity ..... (4)
- BO 403 Systematic Botany ..... (4)
- GN 301 Genetics in Human Affairs ..... (3)
- ZO 221 Conservation of Nat. Resources ..... (3)

Economics Concentration ..... (24 hrs)
- EC 201 Economics I *or*
- ARE 201 Intro. to ARE ..... (3)
- ARE 210 Consumer Economics ..... (3)
- ARE 303 Farm Management ..... (3)
- ARE 306 Agricultural Law *or*
- BUS 305 Legal & Regulatory Environment *or*
- BUS 307 Bus. Law I ..... (3)
- ARE 311 Agricultural Markets ..... (3)
- ARE 312 Agribusiness Marketing ..... (3)
- ARE 321 Agricultural Financial Management .... (3)
- Economics Elective ..... (3)

Sociology Concentration ..... (24 hrs)
- ANT 252 Cultural Anthropology ..... (3)
- SOC 202 Principles of Sociology *or*
- SOC 241 Soc. of Agric. and Rural Society ..... (3)
- SOC 204 Sociology of Family ..... (3)
- SOC 205 Work: Occup. & Professions ..... (3)
- SOC 301 Human Behavior ..... (3)
- SOC 305 Racial and Ethnic Relations ..... (3)
- SOC 311 Community Relationships ..... (3)
- SOC 425 Juvenile Delinquency ..... (3)

Zoology Concentration ..... (26 hrs)
- BIO 125 General Biology ..... (4)
- BO 200 Plant Life ..... (4)
- BO 360 Intro. to Ecology ..... (3)
- BO 365 Ecology Lab ..... (1)
- ZO 201 General Zoology ..... (4)
- ZO 221 Conservation of Nat. Res. ..... (3)
- ZO 303 Vertebrate Zoology ..... (3)
- ZO 304 Vertebrate Zoology Lab ..... (1)
- ZO 353 Wildlife Management ..... (3)

## CURRICULUM IN AGRICULTURAL AND EXTENSION EDUCATION
## AGRICULTURAL EXTENSION CONCENTRATION
## Degree earned: B.S. in Agricultural and Extension Education

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro.Topics in ALS | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| Comm./Speech Elective[1] | 3 |
| History Elective[2] | 3 |
| Math Elective[3] | 3 |
| Any 100-level PE in Fitness & Wellness[4] | 1 |
| | 14 |

| *Spring Semester* | *Credits* |
|---|---|
| ANS 200 Intro.to Animal Science | 3 |
| BIO 125 General Biology | 4 |
| ENG 112 Comp. & Reading | 3 |
| Agric. Elective[5] | 3 |
| Math Elective[3] | 3-4 |
| Physical Education Elective | 1 |
| | 17-18 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BAE 201 Shop Processes & Mgmt. | 3 |
| Chemistry Elective[6] *or* | |
| PY 211 College Physics I | 4 |
| EOE 307 Field Work in OED | 3 |
| Humanities/ Soc. Sci. Elective[7] | 3 |
| Literature Elective[8] | 3 |
| Physical Education Elective | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| AEE (ED) 226 Inst. Technology in Agric. Ed | 3 |
| ARE 201 Intro. to ARE *or* | |
| EC 201 Economics I | 3 |
| FOR 110 Intro. to Forestry *or* | |
| FOR 252 Intro. to Forest Science | 2-3 |
| Phi., Rel, Vis/Perf. Arts Elective[10] | 3 |
| Natural Science Elective[9] | 3-4 |
| Physical Education Elective | 1 |
| | 15-17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| AEE 323 Leadership Dev. in Agric. | 3 |
| AEE 311 Comm. Method & Media | 3 |
| ARE 303 Farm Mgmt. | 3 |
| BAE 323 Water Mgmt. *or* | |
| SSC 200 Soil Science | 3-4 |
| Agricultural Specialty[11] | 3 |
| Plant Science Elective[12] | 3 |
| | 18-19 |

| *Spring Semester* | *Credits* |
|---|---|
| PSY 304 Educational Psy. | 2 |
| Agricultural Elective[5] | 3 |
| Agricultural Specialty[11] | 3 |
| Humanities/Soc. Sci. Elective[7] | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| AEE 422 Public Relations in Agric. *or* | |
| COM 226 Intro.to Public Relations | 3 |
| AEE (ED) 426 Meth. of Teaching Agric. | 3 |
| Agricultural Specialty[11] | 3 |
| Agricultural Specialty[11] | 3 |
| Free Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| AEE 423 Prac. in Ag. Ext./Indust. | 8 |
| AEE 478 Ext. as Non-Form. Education | 3 |
| AEE(ED)492Sr. Seminar in Agric. Education. | 3 |
| | 12 |

Minimum Hours Required for Graduation 123*

*Note. Students must have demonstrated foreign language proficiency at the FL_ 102 level.

[1]Select from approved communication/speech electives.
[2]Select history (HI) courses from the history elective lists.
[3]Mathematical sciences elective list. One course must be a math course.
[4]The first two PE credits do not count toward graduation.
[5]Select from Group C electives in agriculture or agriculture and resource economics courses.
[6]Select a chemistry course from the approved natural sciences courses.
[7]Select from the approved list of humanities and social sciences courses. Must focus on a non-english speaking culture.
[8]Select from approved literature electives.
[9]Select from approved list of natural science electives. Two of the three science courses must be laboratory courses.
[10]Select from the approved list of philosophy, religion, and visual & performing arts courses.
[11]Requires a minimum of twelve (12) semester hours from one area of agriculture or from forestry. These courses must be in addition to courses completed as natural science requirements or courses in the agricultural content area.
[12]Select from courses in botany, crop science, forestry or horticulture.

# CURRICULUM IN AGRICULTURAL AND EXTENSION EDUCATION, COMMUNICATION CONCENTRATION

## Degree earned: B.S. in Agricultural And Extension Education

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| COM 110 Public Speaking | 3 |
| ENG 111 Comp. and Rhetoric | 3 |
| History Elective[1] | 3 |
| Math Elective[2] | 3 |
| Any 100-level PE in Fitness & Wellness [3] | 1 |
| | 14 |

| *Spring Semester* | *Credits* |
|---|---|
| AEE (ED) 226 Instr. Technology in Agric. Education. | 3 |
| ANS 200 Intro. to Animal Science | 3 |
| BIO 125 General Biology | 4 |
| ENG 112 Comp. and Reading | 3 |
| Math Elective[2] | 3 |
| Physical Education Elective[3] | 1 |
| | 17 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BAE 201 Shop Processes & Mgmt. | 3 |
| EOE 307 Field Work in OED | 3 |
| Agricultural Specialty[4] | 3 |
| Chemistry Elective[5] | 4 |
| Economics Elective | 3 |
| Physical Education Elective | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| COM 201 Theories of Persuasive Comm. | 3 |
| FOR 110 Intro. to Forestry or | |
| FOR 252 Intro. to Forest Science | 2-3 |
| SSC 200 Soil Science | 4 |
| Humanities/Soc.Sci. Elective[6] | 3 |
| Literature Elective[7] | 3 |
| Physical Education Elective | 1 |
| | 16-17 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| AEE 311 Comm. Methods & Media | 3 |
| AEE 323 Leadership Dev. in Agric. **or** | |
| AEE 422 Public Relations in Agric. | 2 |
| COM 226 Intro. to Public Relations | 3 |
| Agricultural Elective[8] | 3 |
| Agricultural Specialty[4] | 3 |
| Humanities/Soc.Sci. Elective[6] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| AEE 470 Agricultural Comm | 3 |
| COM 326 Public Relations Applications | 3 |
| Agricultural Specialty[4] | 3 |
| Plant Science Elective[10] | 3 |
| Phil., Relig., Vis/Perf. Arts Elective.[11] | 3 |
| Social Science Elective [9] | 3 |
| | 18 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| AEE (ED) 426 Methods of Teach. Agric. | 3 |
| COM 336 Comm. Technology /Public Relations | 3 |
| COM 456 Organizational Comm. | 3 |
| Agricultural Specialty[4] | 3 |
| Free Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| AEE 423 Pract. in Agric. Ext./Industry | 8 |
| AEE (ED) 490 Senior Seminar in Agric. Education. | 1 |
| Free Elective | 3 |
| | 12 |

Minimum Hours Required for Graduation ..... 124*

***Note:** Students must have demonstrated foreign language proficiency at the FL_ 102 level.

[1]Select history (HI) courses from the history elective list.
[2]Mathematical sciences elective list. One course must be a math course.

[1] The first two PE credits do not count toward graduation.
[2] Requires a minimum of 12 semester hours from one area of agriculture or from forestry. These courses must be in addition to courses from the agricultural content area or courses used to satisfy natural science requirements.
[3] Select a chemistry course from the approved natural sciences courses.
[4] Select from the approved list of humanities and social sciences courses. Foreign language courses may be used to meet this requirement. One course must focus on a non-english speaking culture
[5] Select from approved literature electives.
[6] Select from agricultural and resource economics courses or Group C electives in agriculture
[7] Select from approved list of politics and government courses or sociology courses
[8] Select from courses in botany, crop science, forestry or horticulture
[9] Select from the approved list of philosophy, religion, and visual & performing arts courses.

# DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

Nelson Hall, Room 232

J. A. Brandt, *Head*

C. L. Moore, *Associate Head and Extension Leader*

A. W. Oltmans, *Coordinator of Undergraduate Programs*

W. N. Thurman, *Administrator of Economics Graduate Programs*

*William Neal Reynolds Professor* M. K. Wohlgenant. *Professors* G. A. Carlson, T. J. Grennes, T. Johnson, E. C. Pasour Jr., R. A. Schrimper, W. N. Thurman, M. K. Wohlgenant. *Extension Professors* L. E. Danielson, J. E. Easley, E. A. Estes, M. L. Walden, R. C. Wells. *Adjunct Professor* J. B. Hurt Jr. *Professors Emeriti* R. C. Brooks, A. J. Coutu, R. D. Dahle, D. G. Harwood Jr., D. M. Hoover, L. A. Ihnen, P. R. Johnson, R. A. King, H. L. Liner, T. E. Nichols Jr., D. F. Neuman, G. R. Pugh, J. A. Seagraves, R. L. Simmons, J. G. Sutherland (USDA), W. D. Toussaint, W. L. Turner, C. R. Weathers, J. C. Williamson Jr.; *Associate Professors* J. C. Beghin, G. A. Benson, P. L. Facker, B. K. Goodwin, M. T. Holt, M. C. Marra, A. W. Oltmans, C. D. Safley, K. D. Zering; *Associate Professors Emeriti* J. G. Allgood, R. S. Boals, H. C. Gilliam Jr., D. D. Robinson, P. S. Stone. *Assistant Professors* A. B. Brown, D. L. Lueck, N. E. Piggott, R. B. Larson, A. R. Oltmans, M. A. Renkow, T. Vukina; *Assistant Professors Emeriti* J. C. Matthews Jr., E. M. Stallings. Lecturers: A. M. Beals Jr., S. L. Robinson, H. A. Sampson, III. *Adjunct Instructors* J. S. Becknam, R. A. Bennett, R.R. Gelblum, J. H. Kirch. *Extension Specialists* T. A. Feitshans, G. Van der Hoeven, L. S. Smutko, R. H. Usry.

The Department of Agricultural and Resource Economics serves agricultural, resource and related industries through its extension, research and teaching programs. Applying principles of economics and related disciplines, these programs develop understanding of contemporary economic and business problems and equip students with a knowledge of business organization fundamentals and decision-making skills useful in the operation and management of business firms.

The department offers undergraduate programs leading to a Bachelor of Science degree in Agricultural Business Management. A concentration in biological sciences business

management is offered within the agricultural business management program. The department also offers concentrations within two campus-wide degree programs: a natural resources economics and management concentration leading to a Bachelor of Science degree in Natural Resources (see natural resources curriculum) and an economic policy concentration leading to a Bachelor of Science degree in Environmental Sciences (see environmental sciences curriculum).

The Agricultural Business Management Program prepares graduates for management, marketing, sales, finance and related careers. The program has sufficient flexibility to provide more extensive course work in basic and applied science and math for those students desiring to prepare for advanced graduate study as well. The concentration in biological sciences business management prepares graduates for management, marketing, and sales careers in fields such as biotechnology, pharmaceuticals, health care, environmental protection, food processing and finance dealing with biological issues. This concentration is designed to be an attractive option for students with a strong background and interest in science who seek alternatives to technical science careers.

The natural resources economics and management concentration prepares graduates for careers as managers and administrators with businesses and government agencies responsible for natural resources development and/or waste management.

The environmental sciences economic policy concentration prepares graduates for careers as environmental economists, educators, policy analysts and managers with businesses and government agencies.

## OPPORTUNITIES

The growing number of specialized business firms producing and marketing services and products in agriculture, resource and life science-related industries has created an increasing demand for graduates trained in agricultural and biological sciences business management, resource economics and management and environmental policy. Employment opportunities include careers with companies purchasing, processing and marketing food, fiber and related products; firms producing and marketing production inputs (feed, equipment, chemicals, drugs, etc.) and services; banks; other financial and credit agencies; cooperatives; natural resources management units and consulting firms; and natural resources and environmental educational and regulatory agencies.

Many graduates pursue careers in research and education with various state and federal governments agencies. These agencies include the Cooperative Extension Service, the Agricultural Research Service, the State Department of Agriculture, Environmental Health

and Natural Resources, the United States Department of Agriculture and the Environment Protection Agency.

## CURRICULUM IN AGRICULTURAL BUSINESS MANAGEMENT
## Degree earned: B.S. in Agricultural Business Management

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 105 Biology in Modern World *or* | |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. and Rhetoric | 3 |
| MA 107 Precalculus I | 3 |
| Any 100-level PE in Fitness & Wellness [1] | 1 |
| Humanities/Soc.Sci. Elective[2] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 201 Intro.to Agric. & Res. Economics | 3 |
| ENG 112 Comp. and Reading | 3 |
| MA 114 Intro.to Finite Math. Applications | 3 |
| Communication Elective[3] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BAE 121 Computer Applications in ALS *or* | |
| CSC 200 Intro.to Computers & Uses | 3 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| EC 202 Economic Problems and Issues | 3 |
| MA 121 Elements of Calculus *or* | |
| MA 131 Analytic Geom. & Calculus A | 4 |
| Physical Education Elective[1] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ACC 210 Accounting I *or* | |
| ACC 280 Managerial Accounting | 3 |
| PY 131 Conceptual Physics *or* | |
| PY 211 College Physics | 4 |
| Biol. Science Elective[4] | 3 |
| Humanities/Soc.Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 14 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE (EC) 301 Intermediate Microeconomics | 3 |
| ARE 303 Farm Bus. Mgmt. *or* | |
| ARE 304 Agribusiness Mgmt. *or* | 3 |
| BUS (EC) 310 Managerial Economics | 3 |
| ARE 306 Agricultural Law or | |
| ARE 309 Environ. Law *or* | |
| BUS 307 Bus. Law I | 3 |
| ARE 490 Career Seminar in ARE | 1 |
| Humanities/Soc.Sci. Elective[2] | 3 |
| Technical Agric. Elective[5] | 3 |
| | 19 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 311 Agricultural Markets *or* | |
| ARE 312 Agribusiness Marketing *or* | |
| BUS 360 Marketing Methods | 3 |
| BUS (ST) 350 Economics & Bus. Statistics | 3 |
| EC 302 Intermediate Macroeconomics | 3 |
| ENG 332 Comm. for Bus. & Mgmt. | 3 |
| Technical Agric. Elective[5] | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 321 Agric. Financial Mgmt. *or* | |
| BUS 320 Financial Mgmt. *or* | |
| BUS (EC) 404 Money, Fin. Mkts. & Economics | 3 |
| Departmental[6] *or* Technical Agric.[5] Electives | 6 |
| Technical Agric. Elective[5] | 3 |
| Free Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 433 U.S. Agricultural Policy | 3 |
| BUS 330 Human Res. Mgmt. *or* | |
| BUS 335 Organizational Behavior *or* | |
| EC 431 Labor Economics | 3 |
| Departmental[6] *or* Technical Agric.[5] Electives | 5 |
| Humanities/Soc.Sci. Elective[2] | 3 |
| | 14 |

Minimum Hours Required for Graduation: ..... 120

**Note:** A minimum grade of C in ENG 111 and ENG 112, foreign language proficiency at the FL_102 level, and a grade point average of 2.000 in all ACC, ARE, BUS, EC and ECG courses attempted are required to be eligible for graduation. One course from Science, Technology, and Society (STS) lists is required for graduation; select from either Humanities and Social Sciences Perspective list *or* Science and Technology Perspective list.

[1]Four semester hours of physical education (PE) credit are required for graduation; the first two hours of PE taken may be counted for free elective credit. If a student chooses not to count these first two hours as free elective credit, these hours will not count toward graduation and two additional hours of free elective credit must be completed prior to graduation.

[2]Humanities and Social Science requirements (21 credit hours) are:

a. Two courses from History or Literature Electives lists.
b. One course from Philosophy, Religion or Visual and Performing Arts Elective lists. May be used to fulfill STS requirement.
c. ARE 201 and one course from the following Elective lists: Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography. May be used to fulfill STS requirement.
d. EC 202 and one course from Humanities and Social Sciences Elective lists or Humanities and Social Sciences (Other) Electives list. May be used to fulfill STS requirement.
e. One course among those elected must be from non-English speaking culture course list.

[3]COM 110, COM 112, COM 146, or COM 211.

[4]Group A courses, or GN 301, NTR 301 or SSC 200. See Agric. and Life Sciences section of undergraduate catalog for lists of Group A, B and C courses. May be used to fulfill STS requirement.

[5]Group C or Forestry courses. May be used to fulfill STS requirement.

[6]Any ACC, ARE (except 401 and 403), BUS, EC or ECG courses, or other courses approved by Department. May be used to fulfill STS requirement.

## CURRICULUM IN AGRICULTURAL BUSINESS MANAGEMENT, BIOLOGICAL SCIENCES CONCENTRATION

## Degree earned: B.S. in Agricultural Business Management

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. and Rhetoric | 3 |
| MA 121 Elements of Calculus *or* | |
| MA 131 Analytic Geom. & Calculus A | 4 |
| Any 100-level PE in Fitness & Wellness [1] | 1 |
| Humanities/Soc.Sci. Elective[2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 201 Intro.Agric. & Res. Economics | 3 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 114 Intro.to Finite Math. *or* | |
| MA 231 Analytic Geom. & Calculus B | 3 |
| Physical Education Elective | 1 |
| | 14 |

## SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BAE 121 Computer Applications in ALS *or* | |
| CSC 200 Intro.to Computers & Uses | 3 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ZO 201 General Zoology *or* | |
| ZO 205 Intro.to Cellular & Dev. Zoology *or* | |
| ZO 208 Intro.Org. & Evol. Zoology | 4 |
| Communication Elective[3] | 3 |
| Physical Education Elective[1] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ACC 220 Accounting II *or* | |
| ACC 280 Managerial Accounting | 3 |
| BO 200 Plant Life *or* | |
| Restricted Elective (ARE *or* CALS) | 4 |
| BUS (ST) 350 Economics & Bus. Statistics *or* | |
| ST 361 Intro.Statistics for Engr. | 3 |
| PY 131 Conceptual Physics *or* | |
| PY 211 College Physics I | 4 |
| Physical Education Elective[1] | 1 |
| | 15 |

## JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE (EC) 301 Intermediate Microeconomics | 3 |
| ARE 306 Agricultural Law *or* | |
| ARE 309 Environ. Law & Economics Policy | 3 |
| ARE 490 Career Seminar in ARE | 1 |
| GN 301 Genetics in Human Affairs or | |
| GN 411 Prin. of Genetics | 3-4 |
| HI 322 Rise of Modern Science *or* | |
| HI 341 Technology in History | 3 |
| Restricted Elective (ARE)[4] | 3 |
| | 16-17 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 311 Agricultural Markets *or* | |
| ARE 312 Agribusiness Marketing *or* | |
| BUS 360 Marketing Methods | 3 |
| BO 360 Intro. to Ecology *and* | |
| BO 365 Ecology Lab *or* | |
| BO 400 Plant Diversity *or* | |
| ZO 303 Vertebrate Zoology *and* | |
| ZO 304 Vertebrate Zoology Lab *or* | |
| ZO 450 Evolutionary Biology | 3-4 |
| EC 302 Intermediate Macroeconomics | 3 |
| History *or* Literature Elective[2] | 3 |
| Restricted Elective (ARE *or* CALS)[4,5] *or* | |
| MB 351 General Microbiology | 4 |
| | 16-17 |

## SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 321 Agric. Financial Mgmt. *or* | |
| BUS 320 Financial Mgmt. | 3 |
| COM 201 Persuasion Theory | 3 |
| Phil. *or* Relig. Elective[2] | 3 |
| Restricted Elective (ARE or CALS)[4,5] | 3 |
| Social Science Elective[2,6] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 304 Agribusiness Mgmt. or | |
| BUS (EC) 310 Managerial Economics | 3 |
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 332 Comm. for Bus. & Mgmt. *or* | |
| ENG 333 Comm. for Sci. & Research | 3 |
| Restricted Elective (ARE or CALS)[4,5] | 4 |
| Free Elective | 2-4 |
| | 12-14 |

Minimum Hours Required for Graduation ..... 120

**Note:** A minimum grade of C in ENG 111 and ENG 112, a grade point average of 2.000 in all ACC, ARE, BUS, EC and ECG courses attempted, at least 6 hours of 400 or 500 level courses, and foreign language proficiency at the FL_102 level are required to be eligible for graduation. One course from the Science, Technology, and Society (STS) lists is required for graduation: select from Humanities and Social Sciences Perspective list or Science and Technology Perspective list. HI 322, HI 342, BO(ZO)360/365, GN 301 or Restricted Elective courses can be used to fulfill STS requirement.

[1]Four semester hours of physical education (PE) credit are required for graduation; the first two hours of PE taken may be counted for free elective credit. If a student chooses not to count these first two hours as free elective credit, these hours will not count toward graduation and two additional hours of free elective credit must be completed prior to graduation.
[2]One Humanities and Social Science elective must be from the non-English speaking culture course list. One elective may be used to fulfill STS requirement.

[3]COM 110, COM 112, COM 146, or COM 211.
[4]Restricted electives (ARE) include all ARE Courses (except ARE 401 and ARE 403) and 500-level ECG courses open to advanced undergraduates. May be used to fulfill STS requirement.
[5]Restricted electives (CALS) include all undergraduate courses offered within the College of Agriculture and Life Sciences. May be used to fulfill STS requirement.
[6]Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography. May be used to fulfill STS requirement.

### MINOR IN AGRICULTURAL BUSINESS MANAGEMENT

The Department of Agricultural and Resource Economics offers a minor in Agricultural Business Management. This minor provides students an opportunity to learn basic concepts useful in many careers in agricultural business. A total of 15 hours of course work is required, including ARE 201, and four additional courses chosen from a list of selected courses in agricultural and resource economics and related business fields. Consult the department for specific information.

## CURRICULA IN NATURAL RESOURCES

(Also see Interdisciplinary Programs)

A.W. Oltmans, *Undergraduate Coordinator*, Agricultural and Resource Economics, Nelson Hall, Room 233E

H. J. Kleiss, *Undergraduate Coordinator*, Soil Science, Williams Hall, Room 2321

Wise use of all our natural resources (soil, water, air, minerals, flora, fauna and people) for the benefit of current and future members of society is the goal of natural resource management. This important challenge recognizes the interdependence of people with their environment and requires an integrated, multi-disciplinary approach to solving society's resource problems. Population growth, rising incomes, life style changes and urbanization lead to more intensive use of all natural resources. These trends present challenges to resource managers who must be trained in the basic principles of several disciplines in order to develop and apply sound management strategies to our resource problems. Natural resource professionals must understand resources and the social systems governing their use. They must be able to work in teams to analyze potential effects of resource use and to design ways to make efficient use of natural and environmental resources for current and future generations.

To accommodate the breadth and complexity of natural resource management, the Bachelor of Science degree in natural resources is a campus-wide program involving three colleges and four departments that administer seven concentrations. A common

core of 84 hours of course work provides a balanced foundation in communication, humanities, social sciences, mathematics and the natural sciences. The core course requirements include a freshman orientation course and a senior level applications course that natural resource majors in all concentrations must complete. Within the College of Agriculture and Life Sciences, three concentrations are available: Economics and Management, Soil Resources and Soil and Water Systems. For information on other concentrations see Forestry and Marine, Earth and Atmospheric Sciences.

## CURRICULUM IN NATURAL RESOURCES ECONOMICS AND MANAGEMENT CONCENTRATION

### Degree earned: B.S. in Natural Resources

FRESHMAN YEAR

| Fall Semester | Credits |
|---|---|
| BIO 125 General Biology | 4 |
| CFR 134 Computers in Natural Resources | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 131 Analytic Geom. & Calculus A[1] | 4 |
| NR 100 Intro. to Natural Resources | 2 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| | 15 |

| Spring Semester | Credits |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab. | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 231 Analytic Geom. & Calculus B[1] | 3 |
| PS 201 Intro.to American Govt. **or** | |
| PS 202 State & Local Govt. | 3 |
| Physical Education Elective[2] | 1 |
| | 14 |

SOPHOMORE YEAR

| Fall Semester | Credits |
|---|---|
| ARE 201 Intro.Agric. & Res. Economics or | |
| EC 201 Intro. to Economics I | 3 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| PY 211 College Physic I **or** | |
| PY 205 Physics for Engr. & Sci. I | 4 |
| Communication Elective[3] | 3 |
| Physical Education Elective[2] | 1 |
| | 15 |

| Spring Semester | Credits |
|---|---|
| ARE(EC) 336 Intro.Res. & Env. Economics[4] | 3 |
| BO 200 Plant Life **or** | |
| ZO 201 General Zoology | 4 |
| MA 114 Intro.to Finite Math. Appl. | 3 |
| MEA 101 Geology I: Physical | 3 |
| MEA 110 Geology I Lab | 1 |
| Physical Education Elective[2] | 1 |
| | 15 |

JUNIOR YEAR

| Fall Semester | Credits |
|---|---|
| ARE (EC) 301 Intermediate Microeconomics | 3 |
| ARE 303 Farm Bus. Mgmt. **or** | |
| BUS(EC) 310 Managerial Economics | 3 |
| BO 360 Intro. to Ecology[4] | 3 |
| BO 365 Ecology Lab[4] | 1 |
| SSC 200 Soil Science | 4 |
| ST(BUS) 350 Economics & Bus. Statistics | 3 |
| | 17 |

| Spring Semester | Credits |
|---|---|
| ACC 220 Accounting II **or** | |
| ACC 280 Managerial Accounting | 3 |
| ENG 332 Comm. for Bus. & Mgmt. **or** | |
| ENG 333 Comm. for Sci. & Research | 3 |
| History **or** Literature Elective[5] | 3 |
| Phil., Relig., Vis/Perf.Arts Elective[5] | 3 |
| Restricted Elective[6] | 3 |
| | 15 |

SENIOR YEAR

| Fall Semester | Credit |
|---|---|
| ARE 306 Agricultural Law **or** | |
| ARE 309 Environ. Law & Economic Policy | 3 |
| ARE 321 Agric. Financial Mgmt. **or** | |
| BUS 320 Financial Mgmt. | 3 |
| ARE(EC) 436 Environ. Economics | 3 |
| History **or** Literature Elective[5] | 3 |
| Restricted Elective[6] | 3 |
| | 15 |

| Spring Semester | Credit |
|---|---|
| BUS 455 Quant. Methods in Mgmt. **or** | |
| EC 451 Intro.to Econometrics | 3 |
| EC 410 Public Finance | 3 |
| NR 400 Natural Resource Mgmt. | 4 |
| Restricted Elective[6] | 3 |
| Social Science Elective[5,7] | 3 |
| | 16 |

Minimum Hours required for Graduation ..... 120

Note:A minimum grade of C in ENG 111 and ENG 112, a grade point average of 2.000 in all ACC, ARE, BUS, EC and ECG courses attempted, and foreign language proficiency at the FL_ 102 level are required to be eligible for graduation.

[1]MA 141 and MA 241 may be taken in lieu of MA 131 and MA 231.
[2]Four credit hours of PE (including any 100-level PE) are required for graduation.
[3]Select from COM 110, COM 112, COM 146 or COM 211.
[4]Science, Technology, and Society courses: ARE(EC) 336 from Humanities/Social Sciences Perspective and BO360/365 from Science/Technology Perspective.
[5]One of these courses must focus on a non-English speaking culture.
[6]Restricted Electives include: BAE(SSC) 323, BO 421, CS 411, FOR 252, FOR 401, FW(ZO) 353, FW(FOR) 404, FW(ZO) 420, MEA 130, MEA 135, MEA 140, MEA(ZO) 220, MEA 300, MEA 311, MEA 313, NR 300, SSC 361, SSC 370, SSC 461, ZO 441 or ZO 442.
[7]Select from Psychology, Politics & Government, Sociology, Anthropology, and Cultural Geography Electives lists.

# CURRICULA IN ENVIRONMENTAL SCIENCES

(See Interdisciplinary Programs or Physical Mathematical Sciences)
Nelson Hall, Room 233E, Williams Hall, Room 2321, and North Gardner Hall, Room 3216

A. W. Oltmans, *Coordinator*
Economic Policy Concentration, Nelson Hall, Room 233E

H. J. Kleiss, *Coordinator*
Environmental Soil Science Concentration, Williams Hall, Room 2321

S. C. Mozley, *Coordinator*
Ecology Concentration, Gardner Hall, Room 2104

Environmental sciences in the broadest sense are concerned with the development of basic knowledge about the world's environments and the use of this knowledge to create new and more efficient ways to maintain or enhance the environment for society's benefit. Given the complexity of environmental processes and the many

ways in which humans interact with natural environments, a multidisciplinary systems approach is essential for understanding changes in natural environments. Society's future prospects maintaining and improving our environment depends on advances in the sciences, including ecology and soil science, and their application to environmental problems. Realization of these future prospects depends on advances in economics, other social science and humanities and the use of these advances to develop and maintain effective economic, political and social structures.

Public concern about environmental issues and the resource costs for protecting our environment are increasing. Protecting and improving our environment involves knowledge and systematic problem-solving skills will be essential for environmental scientists. Ecologists and other environmental scientists must be conversant with economics, other social sciences, and humanities, while environmental economists and political scientists must be conversant with physical and biological sciences. The explosive growth of knowledge requires that all environmental scientists be competent in the use of mathematical models and statistics. North Carolina State University's environmental science degree program provides sound training in each of these areas. Successful completion of this diverse and challenging program requires a sound academic background and hard work.

To accommodate the complexity and breadth of environmental sciences, the Bachelor of Science degree in environmental science is a campus-wide program involving two colleges and five departments that administer six concentrations. A common core of 89 hours provides a balanced foundation in communication, humanities social sciences, mathematics and the natural sciences. The core requirements include a freshman introductory environmental science course and a capstone course for seniors in which teams of students from the various concentrations work together on environmental problems from ecological, physical and economic perspectives.

Three departments within the College of Agriculture and Life Sciences offer environmental sciences concentration that allow students to specialize in areas within environmental science: Ecology, Economics Policy and Environmental Soil Science. For information on other concentrations, see Marine, Earth and Atmospheric Sciences and Statistics.

# CURRICULUM IN ENVIRONMENTAL SCIENCES, ECONOMIC POLICY CONCENTRATION

## Degree earned: B.S. in Environmental Sciences

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| E 115 Intro.to Computing Environment. | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Any 100-level in PE in Fitness & Wellness [1] | 1 |
| Social Science Elective[2,3] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CFR 134 Computers in Natural Resources | 1 |
| CSC 112 Into. to Computing - FORTRAN **or** | |
| CSC 114 Intro.to Computing | 3 |
| ENG 112 Comp. & Reading | 3 |
| ES 100 Intro.to Environ. Sci.[4] | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| Physical Education Elective[1] | 1 |
| | 15 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 201 Intro.Agric. & Res. Economics **or** | |
| EC 201 Intro. to Economics I | 3 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| ST 301 Statistical Methods I | 3 |
| Physical Education Elective[1] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE(EC) 336 Intro.Res. & Environ. Economics | 3 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ST 302 Statistical Methods II | 3 |
| Communication Elective[5] | 3 |
| History **or** Literature Elective[3] | 3 |
| Physical Education Elective[1] | 1 |
| | 17 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE (EC) 301 Intermediate Microeconomics | 3 |
| BO 200 Plant Life **or** | |
| ZO 201 General Zoology | 4 |
| PY 205 Physics for Engr. & Sci. I | 4 |
| ST 430 Intro.to Regression Analysis | 3 |
| History **or** Literature Elective[3] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 331 Comm. for Engr. & Technology **or** | |
| ENG 332 Comm. for Bus. & Mgmt. **or** | |
| ENG 333 Comm. for Sci. & Research | 3 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| ST 431 Intro.to Exper. Design **or** | |
| ST 432 Intro.to Survey Sampling | 3 |
| Natural Sciences Elective[6] | 4 |
| | 14 |

### SENIOR YEAR

| *Fall Semester* | *Credit* |
|---|---|
| ARE(EC) 436 Environ. Economics | 3 |
| EC 410 Public Finance | 3 |
| PS 320 U. S. Environ. Law & Politics **or** | |
| PS 336 Global Environ. Politics | 3 |
| Natural Sciences Elective[6] | 4 |
| Phil., Relig., Vis/Perf. Arts Elective[3] | 3 |
| | 16 |

| *Spring Semester* | *Credit* |
|---|---|
| EC 302 Intermediate Macroeconomics | 3 |
| ES 400 Environ. Sciences Project Course[4] | 3 |
| ST 445 Stat. Computing & Data Mgmt. | 3 |
| Restricted Elective[7] | 3 |
| | 12 |

Minimum Hours required for Graduation ..... 120

Note: A minimum grade of C in English 111 and ENG 112, a grade point average of 2.000 in all ACC, ARE, BUS, EC and ECG courses attempted, and foreign language proficiency at the FL_102 level are required to be eligible for graduation.
ARE(EC) 336 fulfills the requirement for a Science, Technology and Society (Humanities and Social Science Perspective) elective.

[1]Four credit hours of PE (including any 100-level PE) are required for graduation.
[2]Select from Psychology, Politics & Government, Sociology, Anthropology, and Cultural Geography Electives lists.
[3]One of these courses must focus on a non-English speaking culture.
[4]New courses to be implemented.
[5]Select from COM 110, COM 112, COM 146 or COM 211.
[6]Select two of the following four courses and their corequisite laboratories: BO 360/BO 365; MEA 101/MEA 110; MEA 130/MEA 135; MEA 200/MEA 210.
[7]Select from ARE 433, EC 435, ECG 515, ECG 533, ECG 540, or ECG 551.

# CURRICULA IN AGRONOMY

Williams Hall

D. A. Knauft, *Head of the Department of Crop Science*

J. L. Havlin, *Head of the Department of Soil Science*

C.D. Raper Jr., *Director of Graduate Programs, Soil Science*

R. P. Patterson, *Undergraduate Coordinator--Crop Science*

H.J. Kleiss, *Undergraduate Coordinator--Soil Science*

R.C. Rufty, *Director of Graduate Programs--Crop Science*

Agronomy is the development and practical application of plant and soil sciences to produce abundant, high quality food, feed, fiber and speciality crops in an environmentally sustainable manner. Agronomists serve a vital role in global agriculture and the maintenance of environmental quality. Students may earn a Bachelor of Science degree within the technology curriculum of the College of Agriculture and Life Sciences with a major in Agronomy. The agronomy curriculum is administered jointly by the Departments of Crop Science and Soil Science. Crop Science relates primarily to the genetics, breeding, physiology and management of field crops and turf. Soil Science is oriented toward soil physics, chemistry, origin, microbiology, fertility and management. For further information and employment opportunities, see the departmental headings for Crop Science and Soil Science.

# CURRICULUM IN AGRONOMY, AGRONOMIC SCIENCES CONCENTRATION
## Degree earned: B.S. in Agronomy

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 131 Analytic Geom. & Calculus A | 4 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 16 |

| *Spring Semester* | Credits |
|---|---|
| BO 200 Plant Life | 4 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 231 Analytic Geom. & Calculus B | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 17 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BAE 121 Computer Appl.in Agric. & Life Sci **or** | |
| CSC 200 Intro. to Computers and Their Uses **or** | |
| ST 311 Intro.to Statistics | 3 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| COM 110 Public Speaking | 3 |
| SSC 200 Soil Science | 4 |
| Physical Education Elective[1] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 201 Intro.to Agric. Res. Economics | 3 |
| CH 221 Organic Chemistry I | 4 |
| CS 213 Crops: Adaptation & Production | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Writing/Speaking Elective[3] | 3 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| CS 414 Weed Science | 4 |
| SSC 341 Soil Fertility & Fertilizers | 3 |
| SSC 342 Soil Fertility Lab | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 421 Plant Physiology | 4 |
| GN 411 Prin. of Genetics | 4 |
| SSC 452 Soil Classification | 4 |
| Humanities/Soc. Sci Elective[2] | 3 |
| Physical Education Elective[3] | 1 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BCH 451 Prin. of Biochemistry | 4 |
| CS 411 Environ. Aspects of Crop Production | 2 |
| ENT 425 General Entomology *or* | |
| PP 315 Prin. of Plant Pathology | 3-4 |
| PY 211 College Physics I | 4 |
| Humanities/Soc. Sci Elective[2] | 3 |
| | 16-17 |

| *Spring Semester* | *Credits* |
|---|---|
| CS 413 Plant Breeding | 2 |
| CS 415 Agronomic Pest Mgmt. Systems. | 3 |
| CS (SSC)490 Senior Seminar | 1 |
| MB 351 General Microbiology | 4 |
| Free Elective | 3-4 |
| | 13-14 |

Minimum Hours Required for Graduation ..... 125[4]

[1]Four semester hours of (PE) physical education (including any 100-level Fitness & Wellness) credit are required for graduation; the first two hours may be counted for free elective credit. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free electives must be completed.

[1] Humanities and Social Sciences Requirements are 21 hours of courses as follows:

A. Two courses from the History and Literature Electives Lists.
B. One course from the Philosophy, Religion, or Visual and Performing Arts Electives Lists.
C. One course from the Psychology, Politics and Government, Sociology, Anthropology, or Cultural Geography Elective Lists.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) Electives List.
E. One course among those elected to fulfill the Humanities and Social Sciences requirements must focus on non-English speaking culture.
F. It is suggested that one course elected to fulfill the Humanities and Social Sciences requirements also come from the Science, Technology, and Society (Humanities and Social Sciences Perspective) elective list. If not taken as a Humanities and Social Sciences Elective, then a course from this list must be taken as a Free Elective.

[3]The Writing and Speaking Elective requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.

[4]Foreign Language proficiency at the FL_ 102 level is required for graduation.

## CURRICULUM IN AGRONOMY, AGRONOMIC BUSINESS CONCENTRATION
## Degree earned: B.S. in Agronomy

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 121 Elements of Calculus | 4 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 200 Plant Life | 4 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| BAE 121 Computer Appl.in Agric. & Life Sci. **or** | 3 |
| CSC 200 Intro. to Computers and Their Uses **or** | 3 |
| ST 311 Intro. to Statistics | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 17 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 201 Intro. Agric. Res. Economics | 3 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| COM 110 Public Speaking | 3 |
| SSC 200 Soil Science | 4 |
| Physical Education Elective[1] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ACC 280 Managerial Accounting | 3 |
| CH 220 Intro. Organic Chemistry | 4 |
| CS 213 Crops: Adaptation & Production | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Writing/Speaking Elective[3] | 3 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CS 414 Weed Science | 4 |
| ENT 425 General Entomology *or* | |
| PP 315 Prin. of Plant Pathology | 3-4 |
| PY 211 College Physics I | 4 |
| SSC 341 Soil Fertility & Fertilizers | 3 |
| SSC 342 Soil Fertility Lab | 1 |
| Physical Education Elective [1] | 1 |
| | 16-17 |

| *Spring Semester* | *Credits* |
|---|---|
| ANS 215 Basic Agricultural Genetics | 3 |
| BO 421 Plant Physiology | 4 |
| EC 201 Economic Problems & Issues | 3 |
| SSC 452 Soil Classification | 3 |
| Physical Education Elective [1] | 1 |
| | 14 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 303 Farm Mgmt. | 3 |
| ARE 311 Agricultural Markets | 3 |
| CS 411 Environ. Aspects of Crop Prod. | 2 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 14 |

| *Spring Semester* | *Credits* |
|---|---|
| CS 415 Agronomic Pest Mgmt. Systems | 3 |
| CS 462 Soil-Crop Mgmt. Systems | 3 |
| CS (SSC) 490 Senior Seminar | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Free Electives | 6-7 |
| | 16-17 |

Minimum Hours Required for Graduation ..... 126[4]

[1]Four semester hours of (PE) physical education (including any 100-level Fitness & Wellness) credit are required for graduation; the first two hours may be counted for free elective credit. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free electives must be completed.

[2]The Humanities and Social Sciences Requirements are 21 hours of courses as follows:

A. Two courses from the History and Literature Electives Lists.
B. One course from the Philosophy, Religion, or Visual and Performing Arts Electives Lists.
C. One course from the Psychology, Politics and Government, Sociology, Anthropology, or Cultural Geography Elective Lists.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) Electives List.
E. One course among those elected to fulfill the Humanities and Social Sciences requirements must focus on non-English speaking culture.
F. It is suggested that one course elected to fulfill the Humanities and Social Sciences requirements also come from the Science, Technology, and Society (Humanities and Social Sciences Perspective) elective list. If not taken as a Humanities and Social Sciences Elective, then a course from this list must be taken as a Free Elective.

[3]The Writing and Speaking Elective requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.

[4]Foreign Language proficiency at the FL_ 102 level is required for graduation.

# CURRICULUM IN AGRONOMY, CROP PRODUCTION CONCENTRATION
## Degree earned: B.S. in Agronomy

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 121 Elements of Calculus | 4 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 200 Plant Life | 4 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| BAE 121 Computer Appl. in Agric. & Life Sci. or CSC200 Intro. to Computers and Their Uses or ST 311 Intro. to Statistics | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 17 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| COM 110 Public Speaking | 3 |
| SSC 200 Soil Science | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 201 Intro. Agric. Res. Economics | 3 |
| CH 220 Intro. Organic Chemistry | 4 |
| CS 213 Crops: Adaptation & Production | 4 |
| Writing/Speaking Elective[3] | 3 |
| Physical Education Elective[1] | 1 |
| | 15 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CS 312 Grassland Mgmt. | 3 |
| CS 414 Weed Science | 4 |
| ENT 425 General Entomology *or* PP 315 Prin. of Plant Pathology | 3-4 |
| SSC 341 Soil Fertility & Fertilizers | 3 |
| SSC 342 Soil Fertility Lab | 1 |
| Physical Education Elective[1] | 1 |
| | 15-16 |

| *Spring Semester* | *Credits* |
|---|---|
| ANS 215 Basic Agricultural Genetics | 3 |
| BO 421 Plant Physiology | 4 |
| PY 211 College Physics I | 4 |
| SSC 452 Soil Classification | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 18 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 303 Farm Mgmt. | 3 |
| CS 411 Environ. Aspects of Crop Prod. | 2 |
| SSC 461 Physical Properties of Plant Growth | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 14 |

| *Spring Semester* | *Credits* |
|---|---|
| CS 413 Plant Breeding | 2 |
| CS 415 Agronomic Pest Mgmt. Systems | 3 |
| CS 462 Soil-Crop Mgmt. Systems | 3 |
| CS (SSC) 490 Senior Seminar | 1 |
| Free Electives | 6-7 |
| | 15-16 |

Minimum Hours Required for Graduation ..... 125[4]

[1]Four semester hours of (PE) physical education (including any 100-level Fitness & Wellness) credit are required for graduation; the first two hours may be counted for free elective credit. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free electives must be completed.

[2]The Humanities and Social Sciences Requirements are 21 hours of courses as follows:

A. Two courses from the History and Literature Electives Lists.
B. One course from the Philosophy, Religion, or Visual and Performing Arts Electives Lists.
C. One course from the Psychology, Politics and Government, Sociology, Anthropology, or Cultural Geography Elective Lists.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) Electives List.
E. One course among those elected to fulfill the Humanities and Social Sciences requirements must focus on non-English speaking culture.
F. It is suggested that one course elected to fulfill the Humanities and Social Sciences requirements also come from the Science, Technology, and Society (Humanities and Social Sciences Perspective) elective list. If not taken as a Humanities and Social Sciences Elective, then a course from this list must be taken as a Free Elective.

[3]The Writing and Speaking Elective requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.

[4]Foreign Language proficiency at the FL_ 102 level is required for graduation.

## CURRICULUM IN AGRONOMY
## SOIL SCIENCE CONCENTRATION
## Degree earned: B.S. in Agronomy

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 121 Elements of Calculus | 4 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 200 Plant Life | 4 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab. | 1 |
| ENG 112 Comp. & Reading | 3 |
| BAE 121 Computer Appl in Agric. & Life Sci or CSC 200 Intro. to Computers and Their Uses | |
| ST 311 Intro. to Statistics | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 17 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| COM 110 Public Speaking | 3 |
| SSC 200 Soil Science | 4 |
| MEA 101 Geology I: Physical | 3 |
| MEA 110 Geology I Lab | 1 |
| Physical Education Elective[1] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 201 Intro.Agric. Res. Economics. | 3 |
| CH 220 Intro.Organic Chemistry | 4 |
| CS 213 Crops: Adaptation & Production | 4 |
| Writing/Speaking Elective[3] | 3 |
| Free Elective | 3 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CS 414 Weed Science | 4 |
| PY 211 College Physics I | 4 |
| SSC 341 Soil Fertility & Fertilizers | 3 |
| SSC 342 Soil Fertility Lab | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ANS 215 Basic Agricultural Genetics | 3 |
| SSC 361 Role of Soils In Environ.Mgmt. | 3 |
| SSC 452 Soil Classification | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BAE 323 Soil/Water Mgmt | 3 |
| BAE 324 Elementary Surveying | 1 |
| CS 411 Environ. Aspects of Crop Prod | 2 |
| SSC 461 Soil Physical Properties of Plant Growth | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 13 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 421 Plant Physiology **or** | 4 |
| MB 351 General Microbiology | 3 |
| CS 415 Agronomic Pest Mgmt. Systems | 3 |
| CS 462 Soil-Crop Mgmt. Systems | 1 |
| SSC (CS) 490 Senior Seminar | 3 |
| Free Elective | 14 |

Minimum Hours Required for Graduation ..... 127[4]

[1]Four semester hours of (PE) physical education (including any 100-level Fitness & Wellness) credit are required for graduation; the first two hours may be counted for free elective credit. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free electives must be completed.

[2]The Humanities and Social Sciences Requirements are 21 hours of courses as follows:

A. Two courses from the History and Literature Electives Lists.
B. One course from the Philosophy, Religion, or Visual and Performing Arts Electives Lists.
C. One course from the Psychology, Politics and Government, Sociology, Anthropology, or Cultural Geography Elective Lists.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) Electives List.
E. One course among those elected to fulfill the Humanities and Social Sciences requirements must focus on non-English speaking culture.
F. It is suggested that one course elected to fulfill the Humanities and Social Sciences requirements also come from the Science, Technology, and Society (Humanities and Social Sciences Perspective) elective list. If not taken as a Humanities and Social Sciences Elective, then a course from this list must be taken as a Free Elective.

[3]The Writing and Speaking Elective requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.

[4]Foreign Language proficiency at the FL_ 102 level is required for graduation.

# CURRICULUM IN AGRONOMY
# TURFGRASS MANAGEMENT CONCENTRATION
## Degree earned: B.S. in Agronomy

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topic in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 121 Elements of Calculus | 4 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 200 Plant Life | 4 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| BAE 121 Computer Appl in Agric. & Life Sci or CSC 200 Intro. to Computers and Their Uses | |
| ST 311 Intro. to Statistics | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 17 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| COM 110 Public Speaking | 3 |
| CS 213 Crops: Adaptation & Production | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 201 Intro. Agric. Res. Economics | 3 |
| CH 220 Intro. Organic Chemistry | 4 |
| CS 200 Intro. to Turfgrass Mgmt. | 3 |
| SSC 200 Soil Science | 4 |
| Writing/Speaking Elective[3] | 3 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CS 414 Weed Science | 4 |
| ENT 425 General Entomology *or* PP 315 Prin. of Plant Pathology | 3-4 |
| SSC 341 Soil Fertility & Fertilizers | 3 |
| SSC 342 Soil Fertility Lab | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 15-16 |

| *Spring Semester* | *Credits* |
|---|---|
| ANS 215 Basic Agricultural Genetics | 3 |
| BO 421 Plant Physiology | 4 |
| PY 211 College Physics I | 4 |
| SSC 452 Soil Classification | 4 |
| Physical Education Elective[1] | 1 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CS 400 Turf Cultural Systems | 4 |
| CS 411 Environ. Aspects of Crop Prod. | 2 |
| SSC 461 Physical Properties of Plant Growth | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CS 415 Agronomic Pest Mgmt. Systems. | 3 |
| CS (SSC) 490 Senior Seminar | 1 |
| HS 342 Landscape Horticulture *or* HS 371 Interior Plantscapes *or* HS 471 Trees & Grounds | 3-4 |
| Free Electives | 5-7 |
| | 12-14 |

Minimum Hours Required for Graduation ..... 123[4]

[1]Four semester hours of (PE) physical education (including any 100-level Fitness & Wellness) credit are required for graduation; the first two hours may be counted for free elective credit. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free electives must be completed.

[2]The Humanities and Social Sciences Requirements are 21 hours of courses as follows:

A. Two courses from the History and Literature Electives Lists.
B. One course from the Philosophy, Religion, or Visual and Performing Arts Electives Lists.
C. One course from the Psychology, Politics and Government, Sociology, Anthropology, or Cultural Geography ElectiveLists.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) Electives List.
E. One course among those elected to fulfill the Humanities and Social Sciences requirements must focus on non-English speaking culture.
F. It is suggested that one course elected to fulfill the Humanities and Social Sciences requirements also come from the Science, Technology, and Society (Humanities and Social Sciences Perspective) elective list. If not taken as a Humanities and Social Sciences Elective, then a course from this list must be taken as a Free Elective.

[3]The Writing and Speaking Elective requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.

[4]Foreign Language proficiency at the FL_ 102 level is required for graduation.

# DEPARTMENT OF ANIMAL SCIENCE

Polk Hall, Room 123

K.L. Esbenshade, *Head*

S.P. Washburn, *Departmental Extension Leader*

E.J. Eisen, *Director of Graduate Programs*

J.C. Cornwell, *Undergraduate Coordinator*

### Teaching, Research and Extension Faculty

*Alumni Distinguished Professors:* J.D. Armstrong, J.C. Cornwell, K.L. Esbenshade; *William Neal Reynolds Professor:* E.J. Eisen; *Professors:* D.G. Braund, L.S. Bull, K.R. Butcher, E.V. Caruolo, R.G. Crickenberger, W.L. Johnson, E.E. Jones, R.L. McCraw, B.T. McDaniel, R.A. Mowrey Jr., R.M. Petters, O.W. Robison, J.W. Spears, C.M. Stanislaw, L.W. Whitlow, J.C. Wilk; *Adjunct Professor:* S.D. Perreault; *Professors Emeriti:* A.V. Allen, T.C. Blalock, E.R. Barrick, R.F. Behlow, D.G. Davenport, R.W. Harvey, J.R. Jones, F.N. Knott, C.A. Lassiter, J.M. Leatherwood, J.G. Lecce, J.E. Legates, C.L. Markert, R.D. Mochrie, R.M. Myers, G.S. Parsons, J.W. Patterson, I.D. Porterfield, A.H. Rakes, H.A. Ramsey, F.D. Sargent, F.H. Smith, L.C. Ulberg, G.H. Wise, J.R. Woodard. *Associate Professors:* B.P. Alston-Mills, J.H. Eisemann, C.E. Farin, W.L. Flowers, B.A. Hopkins, R.E. Lichtenwalner, W.E. Morgan Morrow, J. Odle, M.H. Poore, S.P. Washburn; *Adjunct Associate Professors* M.T. Coffey, E.C. Segerson Jr.;*Associate Professors Emeriti:* E.U. Dillard, J.J. McNeil; *Assistant Professors:* M.T. See, C.M. Williams; *Visiting Assistant Professors:* S.L. Ash, J.A. Moore; *Lecturer:* M. Yoder; *Extension Specialists:* B.C. Allison, M.C. Claeys, J.S. Clay, G.M. Gregory, D.C. Miller; *Extension Specialist Emeritus:* J.W. Parker; *Associate Members of the Faculty:* J.D. Armstrong (CALS Administration), L.S. Ball (International Programs), G.A. Benson (Agricultural and Resource Economics); J.H. Britt (Veterinary Administration); J.C. Burns (USDA); R.G. Crickenberger (Agriculture and Natural Resources); W.M. Hagler (Plant Pathology, Poultry Science); D.K. Larick (Food Science); B.R. Poulton (Curriculum & Instruction); M.D. Whitacre (Food Animal and Equine Medicine, CVM)

Animal Science is a broad field centered on the biology, production, management, and care of domestic animals. Animals have, throughout history, provided man with a major source of food, fiber, pleasure and companionship. Undergraduate students

study subjects related to various phases of animal science. Courses are offered in anatomy, physiology, nutrition, genetics, and management, and there are opportunities for the application of basic scientific training in the husbandry areas. Options for course selection by each student make it possible for those with varying backgrounds and wide-ranging interests to become involved in stimulating and rewarding experiences.

## OPPORTUNITIES

Opportunities for animal scientists are boundless and the areas of emphasis are diverse. Animal science graduates are qualified for positions in a wide variety of areas such as: livestock production, animal management, feed and animal health product companies, livestock marketing, food processing industries, feedlot managers, management consultants, state and federal departments of agriculture, breed associations, education, financial institutions, livestock publications, technical service managers, animal technicians, media specialists, agricultural extension service and public relations. Animal scientists can be found across the nation and around the world in all phases of production, research, sales, service, business and education. Many students in pre-veterinary medicine obtain degrees in animal science. Students may elect graduate study, after which they will find opportunities in teaching, research, and extension. See listing of graduate degrees offered.

## CURRICULA

The degree of Bachelor of Science with a major in animal science may be obtained under either the science or industry curricula offered in the College of Agriculture and Life Sciences. The science curriculum (SAS) is designed for students with interest in advanced study in disciplines such as physiology, nutrition, and genetics. Many students in pre-veterinary medicine (SPV) are enrolled in this curriculum pursuing a Bachelor of Science Degree in Animal Science. The industry (IAS) curriculum is for students interested in entry into the animal industry or allied businesses. It offers flexibility in complementing animal science with business, economics, and applied science course work.

## SCIENCE CURRICULUM IN ANIMAL SCIENCE

### Degree earned: B.S. in Animal Science

*(These requirements are effective for all new freshmen and transfer students with fewer than 28 credit hours entering in the summer of 1994 or thereafter.)*

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| ANS 100 Perspectives in Animal Science | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 107 Precalculus I | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 121 Elements of Calculus *or* | |
| MA 131 Analytic Geom. & Calculus A | 4 |
| Free Elective | 3 |
| Physical Education Elective[1] | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ANS 130 Anatomy & Physio. of Domestic Animals | 4 |
| ANS (HS) 215 Basic Agricultural Genetics | 3 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| PY 211 College Physics I | 4 |
| Physical Education Elective[1] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ANS 220 Repro., Lact. & Behav of Dom. Animals | 4 |
| CH 221 Organic Chemistry I | 4 |
| COM 110 Public Speaking | 3 |
| PY 212 College Physics II | 4 |
| Physical Education Elective[1] | 1 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ANS 230 Nutrition & Growth of Domestic Animals | 3 |
| ARE 201 Intro.to Agric. Res. Economics *or* | |
| EC 201 Intro. to Economics I[2] | 3 |
| CH 223 Organic Chemistry II | 4 |
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 332 Comm. for Bus. & Mgmt. *or* | |
| ENG 333 Comm. for Sci. & Research | 3 |
| GN 411 Prin. of Genetics | 4 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| MB 351 General Microbiology | 4 |
| ST 311 Intro. to Statistics | 3 |
| Animal Science Elective[3] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Literature Elective[2] | 3 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ANS 490 Seminar in Animal Science | 2 |
| Animal Science Mgmt. Course[4] | 3 |
| History Elective[2] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Restricted Elective[5] | 3 |
| Free Elective | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| Animal Science Electives[3] | 6 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Restricted Elective[5] | 2 |
| Free Elective | 4 |
| | 15 |

Minimum Hours Required for Graduation ..... 128[6]

[1]Any PE 100-level course for Fitness & Wellness and three additional credits of PE activity courses are required.
[2]The Humanities and Social Sciences requirements are 21 hours of courses as follows:
A.One course from History Electives list and one course from Literature Electives list.
B.One course from the Philosophy, Religion, or Visual and Performing Arts Electives lists.
C.One course from Economics list and one course from one of the following lists: Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography.
D.Two courses from any of the above lists or the Humanities and Social Sciences (additional) list.
E.One of the courses among those elected to fulfill the Humanities and Social Sciences requirements must focus on a non-English speaking culture.
F.One of the courses elected to fulfill the Humanities and Social Sciences requirements must come from the Science, Technology, and Society (Humanities and Social Science Perspective) list.
[3]Animal Science Electives (12 credits; 3 must be from courses under footnote 4)

| | Credits |
|---|---|
| ANS 210 Microcomputers in Animal Production | 2 |
| ANS 250 Applied Animal Nutrition | 3 |
| ANS 303 Principles of Equine Evaluation | 2 |
| ANS 310 Basic Horse Husbandry | 3 |
| ANS 322 Muscle Foods and Eggs | 3 |
| ANS 324 Milk and Dairy Products | 3 |
| ANS 340 Selection Domestic Animals | 3 |
| ANS 402 Beef Cattle Management | 3 |
| ANS 403 Swine Management | 3 |
| ANS 404 Dairy Cattle Management | 3 |
| ANS 406 Sheep Management | 3 |
| ANS 410 Equine Management | 3 |
| ANS 415 Comparative Nutrition | 3 |
| VMF 420 Diseases of Farm Animals | 3 |

[4]Student selects one course from the following Animal Science management courses: ANS 402, ANS 403, ANS 404, ANS 406, ANS 410.
[5]Electives must be chosen from Groups A, B, or C as listed in the University Bulletin.
[6] Foreign language proficiency at the FL_ 102 level is required for graduation.

## INDUSTRY CURRICULUM IN ANIMAL SCIENCE

### Degree earned: B.S. in Animal Science

*(These requirements are effective for all new freshmen and transfer students with fewer than 28 credit hours entering in the summer of 1994 or thereafter.)*

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS. | 1 |
| ANS 100 Perspectives in Animal Science | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 107 Precalculus I | 3 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 121 Elements of Calculus *or* | |
| MA 131 Analytic Geom. & Calculus A | 4 |
| Free Elective | 3 |
| Physical Education Elective[1] | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ANS 130 Anatomy & Physio. of Domestic Animals | 4 |
| ANS (HS) 215 Basic Agricultural Genetics | 3 |
| ARE 201 Intro.to Agric. Res. Economics *or* | |
| EC 201 Intro. to Economics I[2] | 3 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| Physical Education Elective[1] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ANS 220 Repro., Lact. & Behavior of Dom. Animals | 4 |
| CH 220 Intro. Organic Chemistry | 4 |
| COM 110 Public Speaking | 3 |
| Economics or Bus. Elective[3] | 3 |
| Literature Elective[2] | 3 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ANS 230 Nutrition & Growth of Dom. Animals | 3 |
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 332 Comm. for Bus. & Mgmt. *or* | |
| ENG 333 Comm. for Sci. & Research | 3 |
| PY 131 Conceptual Physics | 4 |
| Economics or Bus. Elective[3] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| ST 311 Intro. to Statistics | 3 |
| Animal Science Elective[4] | 3 |
| History Elective[2] | 3 |
| Restricted Electives[5] | 8 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ANS 490 Seminar in Animal Science. | 2 |
| Animal Science Mgmt.Course | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Restricted Elective[5] | 3 |
| Free Elective | 4 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| Animal Science Elective[4] | 4 |
| Animal Science Mgmt. Course | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Restricted Elective[5] | 3 |
| Free Elective | 3 |
| | 16 |

Minimum Hours Required for Graduation ..... 128[7]

[1]Any 100-level PE course in Fitness & Wellness and three additional credits of PE activity courses are required.

[2]The Humanities and Social Sciences requirements are 21 hours of courses as follows:

A. One course from History Electives list and one course from Literature Electives list.
B. One course from the Philosophy, Religion, or Visual and Performing Arts Electives lists.
C. One course from Economics list and one course from one of the following lists: Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography.
D. Two courses from any of the above lists or the Humanities and Social Sciences (additional) list.
E. One of the courses among those elected to fulfill the Humanities and Social Sciences requirements must focus on a non-English speaking culture.
F. One of the courses elected to fulfill the Humanities and Social Sciences requirements must come from the Science, Technology, and Society (Humanities and Social Science Perspective) list.

[3]Economics or Business Elective

A. One course in management or marketing selected from the following:
    ARE 303 Farm Management
    ARE 304 Agribusiness Management
    ARE 311 Agricultural Markets
    ARE 312 Agribusiness Marketing
B. One course from the following:
    ACC 280 Managerial Accounting
    ARE 303 Farm Management

ARE 304 Agribusiness Management
ARE 306 Agricultural Law
ARE 311 Agricultural Markets
ARE 312 Agribusiness Marketing
ARE 321 Agricultural Financial Management
BUS 307 Bus. Law
BUS 310 Managerial Economics
BUS 320 Financial Management
BUS 330 Human Resource Management
BUS 360 Marketing Methods

[4]Animal Science Electives (13 credits; 6 must be from courses under footnote 6) Credits

ANS 210 Microcomputers in Animal Production ..... 2
ANS 250 Applied Animal Nutrition ..... 3
ANS 303 Principles of Equine Evaluation ..... 2
ANS 310 Basic Horse Husbandry ..... 3
ANS 322 Muscle Foods and Eggs ..... 3
ANS 324 Milk and Dairy Products ..... 3
ANS 340 Selection Domestic Animals ..... 3
ANS 402 Beef Cattle Management ..... 3
ANS 403 Swine Management ..... 3
ANS 404 Dairy Cattle Management ..... 3
ANS 406 Sheep Management ..... 3
ANS 410 Equine Management ..... 3
ANS 415 Comparative Nutrition ..... 3
VMF 420 Diseases of Farm Animals ..... 3

[5]Restricted electives must be chosen from Groups A, B, or C as listed in the University Bulletin.
[6]Student must select two (6 credits) of the following Animal Science management courses: ANS 402, ANS 403, ANS 404, ANS 406, ANS 410.
[7] Foreign language proficiency at the FL_ 102 level is required for graduation.

## MINOR IN ANIMAL SCIENCE

A minor in Animal Science is open to all interested baccalaureate students. It is designed primarily to complement curricula in Agricultural Business Management, Agricultural Economics, Agricultural Education, Agronomy, Food Science, Poultry Science, and Zoology. Students completing a minor in Animal Science will become familiar with animal production and with its related industries, their fundamental components, terminology, and dynamic nature.

The minor requires a minimum of 15 credit hours, and its course of study is flexible in order that students may emphasize the discipline or species of their interest.

# DEPARTMENT OF BIOCHEMISTRY

Polk Hall, Room 128

J. M. Moyer, *Interim Head and Director of Graduate Programs*

J.A. Knopp, *Undergraduate Coordinator*

**Teaching, Research and Extension Faculty**

*William Neal Reynolds Professor* W. L. Miller; *University Professor* E. C. Theil; *Professors*: P. F. Agris, E. C. Sisler, J. D. Orvos, E.S. Maxwell; *Adjunct Professor* K. S. Korach; *Professors Emeriti* F. B. Armstrong, H. R. Horton, J. S. Kahn, I. S. Longmuir; *Associate Professors*: L. K. Hanley-Bowdoin, C. C. Hardin, J. A. Knopp, P. L. Wollenzien; *Assistant Professors* C. L. Hemenway, J. C. Hall; *Visiting Assistant Professors*: D. G. Presutti, H. S. Gracz; *Associate Members of the Faculty*: H. M. Hassan (Microbiology), R. R. Sederoff (Forestry, Genetics), H. E. Swaisgood (Food Science), D. E. Sayers (Physics).

The Biochemistry program provides B. S. graduates with the scientific background and skills required for employment in university, industrial, state, and federal research laboratories. The curriculum is especially suited to students preparing for graduate study in biochemistry, molecular biology, biotechnology, medicine, and related fields. It emphasizes the fundamentals of biological and physical sciences, offering students breadth of knowledge and depth of understanding. The curriculum provides students with broad experience in biological and chemical laboratories and encourages the development of experimental skills. Opportunities are provided for highly qualified students to undertake honors research during their junior and/or senior years.

## CURRICULUM IN BIOCHEMISTRY

### Degree earned: B.S. in Biochemistry

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ALS 103 Intro. Topics in ALS | 1 | CH 107 General Chemistry II | 3 |
| BIO 125 General Biology | 4 | CH 127 General Chemistry II Lab | 1 |
| CH 101 General Chemistry I | 3 | ENG 112 Comp. & Reading | 3 |
| CH 121 General Chemistry I Lab | 1 | MA 231 Analytic Geom. & Calculus B *or* | |
| ENG 111 Comp. & Rhetoric | 3 | MA 241 Analytic Geom. & Calculus II[1a] | 3-4 |
| MA 131 Analytic Geom. & Calculus A *or* | | Botany Zoology Elective[3] | 4 |
| MA 141 Analytic Geom. & Calculus I[1] | 4 | Physical Education Elective[2] | 1 |
| Any 100-level PE in Fitness & Wellness | 1 | | 18-19 |
| | 17 | | |

## SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 221 Organic Chemistry I | 4 |
| MA 242 Analytic Geom. & Calculus III *or* | |
| ST 311 Intro. to Statistics[1,4] | 3-4 |
| PY 205 Physics for Engr. & Sci. I *or* | |
| PY 211 College Physics I[5] | 4 |
| Humanities/Soc.Sci. Elective[6] | 3 |
| Physical Education Elective | 1 |
| | 15-16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| PY 208 Physics for Engr. & Sci. II *or* | |
| PY 212 College Physics II[5] | 4 |
| Computer, Math, *or* | |
| Statistics Elective[7] | 3 |
| Humanities/Soc.Sci. Elective[6] | 3 |
| Physical Education Elective | 1 |
| | 15 |

## JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BCH 451 Prin. of Biochemistry | 4 |
| BCH 452 Intro. Biochemistry Lab | 2 |
| GN 411 Prin. of Genetics | 4 |
| Humanities/Soc. Sci. Elective[6] | 3 |
| Free Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BCH 453 Metabolism & Molecular Biology | 3 |
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 333 Comm. for Sci. & Research[8] | 3 |
| MB 351 General Microbiology | 4 |
| Cell Biology or Physiology Elective[9] | 3-4 |
| Humanities/Soc. Sci. Elective [6] | 3 |
| | 16-17 |

## SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BCH 454 Advanced Biochemistry Lab *or* | |
| Research Elective[10] | 3-4 |
| CH 331 Intro. Physical Chemistry *or* | |
| CH 431 Physical Chemistry I[11] | 3-4 |
| Humanities/Soc. Sci. Elective[6] | 3 |
| Humanities/Soc. Sci. Elective[6] | 3 |
| Free Elective(s) | 0-6 |
| | 12-20 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 433 Physical Chemistry II[11] *or* | |
| Free Elective | 3 |
| Humanities/Soc.Sci. Elective[6] | 3 |
| Lab Analysis Elective[12] | 3-4 |
| Free Elective | 3 |
| | 12-13 |

Minimum Hours Required for Graduation [2] ..... 124

[1]The 3-semester calculus sequence MA 141,241,242 is prerequisite to PY 205 and PY 208 as well as to CH 431 and CH 433, and is strongly recommended for students who plan *graduate studies in Biochemistry.*

[2]First two PE credits do not count toward the minimum credit hours required for graduation.

[3]Botany or Zoology elective to be selected from BO 200, ZO 201, ZO 205, or ZO 208.

[4]ST311 is not an option as a replacement for MA 242.

[5]The calculus-based physics sequence, PY 205 and PY 208, is recommended for students who plan *graduate studies in Biochemistry.*

[6]To be selected from GER list. Two courses from the GER History and Literature Electives Lists; one course from the GER Philosophy, Religion, or Visual & Performing Arts Electives Lists; one course from the GER Economics Electives List; one course from the GER Psychology, Politics & Government, Sociology, Anthropology, or Cultural Geography Electives Lists; one additional course selected from any Humanities or Social Sciences Electives; and one course that must focus on Science and Technology from a humanities/social perspective.

[7]An elective course in computer science (CSC 200, BAE 121, etc.), in mathematics (with a calculus prerequisite) or in statistics.

[8]To be selected from the GER Advanced Writing-Major Paper Requirement Options: ENG 331 or ENG 333.

[9]Cell Biology/Physiology electives include BO 421 (4 cr), PO 405 (4 cr), ZO 421 (3 cr), and ZO(BO) 414 (3 cr).

[10]Research electives may be selected from BCH 492 *or* BCH 493 *or* ALS 498H *and* ALS 499H. (Research only).

[11]The 2-semester Physical Chemistry sequence, CH 431 and CH 433, is recommended for students who plan *graduate studies in Biochemistry.*

[12]Lab Analysis electives include CH 315 (4 cr), CH 428 (3 cr), and FS 403 (3 cr). BCH 454 (4 cr) may also be selected as a Lab Analysis elective by students who take at least 3 credit hours of Research elective(s).

# DEPARTMENT OF BIOLOGICAL AND AGRICULTURAL ENGINEERING

David S. Weaver Laboratories, Room 100
(See College of Engineering)

D. B. Beasley, *Head*

F. J. Humenik, *Department Extension Leader and Associate Head*

J. H. Young, *Director of Graduate Programs*

C. G. Bowers Jr., *Undergraduate Coordinator*

**Teaching, Research and Extension Faculty**

*Distinguished University Professor and William Neal Reynolds Professor:* R. W. Skaggs; *Professors:* C. F. Abrams Jr., J. C. Barker, D. B. Beasley, R. W. Bottcher, C. J. Bowers Jr., F. J. Humenik, E. G. Humphries, W. H. Johnson, G. J. Kriz, W. F. McClure, R. E. Phillips, R. P. Rohrbach, A. R. Rubin, R. S. Sowell, L. F. Stikeleather, P. W. Westerman, T. B. Whitaker (USDA), D. H. Willits, J. H. Young; *Adjunct Professors:* F. E. Barton II, L. M. Safley Jr., S. S. Schiffman; *Professors Emeriti:* E. O. Beasley, G. B. Blum Jr., H. D. Bowen, J. W. Dickens, L. B. Driggers, J. M. Fore, G. W. Giles, E. L. Howell, F. M. Richardson, R. E. Sneed, C. W. Suggs, R. W. Watkins, E. H. Wiser; *Associate Professors:* G. R. Baughman, S. M. Blanchard, M. D. Boyette, R. L. Huffman, G. D. Jennings, J. E. Parsons; *Assistant Professors:* J.J. Classen, R. O. Evans, S. A. Hale; *Adjunct Assistant Professors:* D. D. Archibald, R. L. Langley, S. K. Seymour; *Senior Researcher.* G. M. Chescheir, S. C. Mohapatra; *Extension Specialists:* S. W. Coffey, J. A. Gale, D. E. Line, R. L. McLymore, D. L. Osmond, J. M. Rice, R. E. Sheffield, R. L. Sherman, J. Spooner; *Associate Members of the Faculty:* B. E. Farkas (Food Science), A. E. Hassan (Forestry), T. M. Losordo (Zoology), S. C. Roe (Companion Animal & Special Species Medicine), K. R. Swartzel (Food Science).

Biological engineering "brings engineering to life". Students analyze and develop solutions to unique problems of biological and agricultural systems. Two curricula are offered: Biological Engineering and Agricultural and Environmental Technology. An area of concentration in the Biological Engineering Curriculum or an emphasis area in the Agricultural and Environmental Technology Curriculum can be chosen whereby scientific and engineering principles are applied to problems in a particular area. The Biological and Agricultural Engineering Department may be viewed on the World Wide Web at : http://www2.ncsu.edu/bae

## OPPORTUNITIES

The Biological Engineering Curriculum provides opportunities for students to conceptualize, design, and develop systems for producing, processing and packaging a high quality food supply and maintaining a high quality environment. Jobs can be in design, development and research in public institutions and in industry. Examples are food engineers for food processing companies, biomedical engineers for

biomedical companies, design engineers for agricultural equipment companies, and environmental engineers for government environmental agencies, industry or engineering consulting firms. This curriculum, accredited by the Accreditation Board for Engineering and Technology, also provides adequate training for post-graduate work leading to advanced degrees in Biological and Agricultural Engineering.

The Agricultural and Environmental Technology Curriculum provides graduates opportunities in technical analysis, application and evaluation of agricultural production systems and their associated environmental systems. The curriculum's flexibility enables students to specialize technologically in agriculture, the environment, or business management. Jobs include technicians in production agriculture, environmental technicians, agribusiness sales and service, extension agents and agricultural advisers.

## CURRICULA

The Biological Engineering curriculum provides an educational program for students which uniquely prepares them for dealing with engineering problems in the biological and agricultural areas. Flexibility in the program allows the student to choose electives which may lead to concentrations in the areas of: biomedical engineering, environmental engineering, bioprocess engineering, agricultural engineering, or an emphasis area designed by the student and his/her advisor. Emphasis is placed on basic science and engineering courses such as mathematics, physics, chemistry, mechanics, biology, soils, and thermodynamics which provide a sound background for the application of engineering to biological systems.

The program is jointly administered by The College of Engineering and The College of Agriculture and Life Sciences in order to assure quality of basic training in both engineering and the life sciences. Undergraduate freshmen entering this curriculum should enroll in the College of Engineering undesignated program and indicate BEU as their curriculum choice. After successfully completing the Engineering undesignated requirements the student will enter the Biological and Agricultural Engineering Department (BE). Graduates receive a B.S. in Biological Engineering.

For the biological engineering program, refer to College of Engineering section of this catalog.

The Agricultural and Environmental Technology curriculum is intended to provide an educational program for students which uniquely prepares them for applying science, technology and business principles to efficiently manage agricultural and environmental systems. Flexibility within the program allows students to attain depth

in science, business, or environmental areas related to agricultural systems. Graduates are prepared to apply mechanical and information technology to production, agricultural and environmental issues or to other industries interfacing with natural resources or agriculture. They provide a critical link in the agricultural and environmental spectrum by interacting directly with both the production personnel as well as the designers and implementers of technological systems.

## CURRICULUM IN AGRICULTURAL AND ENVIRONMENTAL TECHNOLOGY

### Degree earned: B.S. in Agricultural and Environmental Technology

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ALS 103 Intro. Topics in ALS | 1 | CH 101 General Chemistry I | 3 |
| BAE 121 Computer Applications in ALS | 3 | CH 121 General Chemistry I Lab. | 1 |
| ENG 111 Comp. & Rhetoric | 3 | ENG 112 Comp. and Reading | 3 |
| MA 131 Analytic Geom. & Calculus A | 4 | MA 231 Analytic Geom. & Calculus B | 3 |
| Any 100-level PE in Fitness & Wellness [1] | 1 | Humanities/Soc. Sci. Elective[2] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 | Physical Education Elective[1] | 1 |
| | 15 | | 14 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| BIO 125 General Biology | 4 | ARE 201 Intro. to Agric. Res. Economics[2] | 3 |
| CH 107 General Chemistry II | 3 | BAE 201 Shop Processes & Mgmt. | 3 |
| CH 127 General Chemistry II Lab | 1 | MA 114 Intro. to Finite Math | 3 |
| GC 120 Foundations of Graphics | 3 | PY 212 College Physics II | 4 |
| PY 211 College Physics I | 4 | SSC 200 Soil Science | 4 |
| Physical Education Elective[1] | 1 | | 17 |
| | 16 | | |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| BAE (SSC) 323 Water Mgmt. | 3 | BAE 311 Agric. Mach. & Power Units *or* | |
| BAE (SSC) 324 Elementary Surveying | 1 | BAE 332 Animal Facilities & Env. Mgmt. | 4 |
| Agric. and Res. Economics Elective[4] | 3 | BAE 333 Processing Agric. Products | 4 |
| Communication Elective[5] | 3 | ST (BUS) 350 Economics & Bus. Statistics. | 3 |
| Group A, B, and C Elective[3] | 3 | Group A, B and C Elective[3] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 | Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 | | 17 |
| | 17 | | |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BAE 343 Agric. Electrification | 3 |
| BAE 344 Circuits & Controls | 1 |
| BAE 432 Agric. & Environ. Safety & Health | 3 |
| Group A, B, and C Elective[3] | 3 |
| Group A, B, and C Elective[3] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BAE 311 Agric. Mach. & Power Units *or* | |
| BAE 332 Animal Facilities & Env. Mgmt | 4 |
| BAE 442 Systems Applic. Agric. & Environ. Issues. | 3 |
| Agric. and Res. Economics Elective[4] | 3 |
| Group A, B and C Elective[3] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 16 |

Minimum Hours Required for Graduation ..... 126

[1]Only 2 of the 4 credit hours in PE will count toward graduation.
[2]Twenty-one hours of Humanities & Social Sciences Electives are required as follows:
A.Two courses from the History Electives List and/or the Literature Electives List.
B.One course from the Philosophy Electives, Religion Electives, and Visual and Performing Arts Electives Lists.
C.One course from the Psychology Electives, Politics and Government Electives, Sociology Electives, Anthropology Electives, and Cultural Geography Electives Lists.
D.ARE 201 Intro. to Agricultural and Resource Economics.
E.Two courses from any of the above Lists plus the Economics Electives List and the Humanities and Social Sciences (Additional) List.
**Note:** Of the six courses (in addition to ARE 201) elected to fulfill the Humanities and Social Sciences Requirements:
a. One must focus on a non-English culture, and
b. One may be used to satisfy the requirement of one course from the Science, Technology & Society (Humanities and Social Sciences Perspective) List.
[2,3,4]One of the seven H&SS courses, or one of the other electives in the curriculum, must be from the Science, Technology and Social Sciences (H&SS Perspective) List.
[3]Group A, B, and C Electives can emphasize agricultural, environmental or business areas.
[4]Choose from ARE 303, ARE 304, ARE 306, ARE 309, ARE 311, ARE 312, ARE 321 and ARE(EC) 336.
[5]Choose from ENG 331, ENG 332, and ENG 333.

Other requirements:
- Foreign language proficiency at the FL_ 102 level is required for graduation.
- A major written paper in the junior and senior years (in BAE 323 in Jr. year, and in BAE 442 in the Sr. year).

- Foreign language proficiency at the FL_ 102 level is required for graduation.
- A major written paper in the junior and senior years (in BAE 323 in Jr. year, and in BAE 442 in the Sr. year).

# CURRICULUM IN BIOLOGICAL SCIENCES

Bostian Hall, Room 2717

R. L. Beckmann, *Coordinator*

R. L. Beckmann, *Undergraduate Coordinator*

**Teaching, Research and Extension Faculty**

*Professors:* C. F. Lytle (Zoology), B. M. Parker (Entomology); *Associate Professors.* R. L. Beckmann Jr. (Botany), M. Niedzlek-Feaver (Zoology), B.C. Haning (Plant Pathology), J. E. Mickle (Botany); *Laboratory Supervisor:* P. M. Aune (Botony); *Laboratory Manager:* T. B. Johansson (Biological Sciences); *Teaching Technician:* W. P. Crumpler (Microbiology).

The Biological Sciences constitute a rapidly developing field offering many challenging and rewarding opportunities for well-trained students. The Biological Sciences Interdepartmental Program offers a B.S. degree in Biological Sciences for students seeking comprehensive training in biology and the supporting sciences.

Many graduates of this program continue further studies in graduate schools in such diverse fields as botany, zoology, marine biology, physiology, genetics, biochemistry, biotechnology, pharmacology, and microbiology. Others attend professional schools in medicine, optometry, and veterinary medicine as well as other health-related fields.

The Biological Sciences curriculum provides a modern, flexible undergraduate program to prepare students for rewarding careers in research and teaching as well as in business, industry, research institutes and governmental agencies. A wide range of career opportunities are available in technical sales, manufacturing and quality control, environmental management, and other positions with pharmaceutical companies, food manufacturers, medical laboratories, public utilities, and other industries.

Biological Sciences majors may elect a general program of study or the Nutrition concentration option. A joint program with the Department of Mathematics and Science Education leads to a double major and a teaching certificate.

# CURRICULUM IN BIOLOGICAL SCIENCES
## Degree earned: B.S. in Biological Sciences

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro.Topics in ALS | 1 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 111 Comp. and Rhetoric | 3 |
| MA 131 Analytic Geom. and Calculus A *or* | |
| MA 141 Analytic Geom. and Calculus I | 4 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ENG 112 Comp. and Reading | 3 |
| MA 231 Analytic Geom. and Calculus B *or* | |
| MA 241 Analytic Geom. and Calculus II | 3-4 |
| Physical Education Elective[1] | 1 |
| | 15-16 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BAE 121 Computer Applications in ALS *or* | |
| CSC 200 Intro.to Computers and Uses *or* | |
| MA 242 Analytic Geom. and Calculus III *or* | |
| ST 311 Intro. to Statistics | 3-4 |
| BO 200 Plant Life *or* | |
| BO 400 Plant Diversity | 4 |
| CH 221 Organic Chemistry I | 4 |
| Humanities/Soc. Sci. Electives[2] | 6 |
| Physical Education Elective[1] | 1 |
| | 18-19 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| ZO 201 General Zoology *or* | |
| ZO 303 Vertebrate Zoology *and* | |
| ZO 304 Vertebrate Zoology Lab *or* | |
| ZO 402 Invertebrate Zoology *and* | |
| ZO 403 Invertebrate Zoology Lab | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| Free Elective | 3 |
| | 15 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BO 360 Intro. to Ecology | 3 |
| BO 365 Ecology Lab | 1 |
| PY 205 Physics for Engr. and Sci. I *or* | |
| PY 211 College Physics I | 4 |
| Humanities/Soc. Sci. Electives[2] | 6 |
| Writing/Speaking Elective[3] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| BCH 451 Prin. of Biochemistry | 4 |
| ALS 498 Honors Research or Teaching I[4] *or* | |
| BIO 492 External Learning Experience *or* | |
| BIO 493 Special Problems in Bio. Sci. | 3 |
| GN 411 Prin. of Genetics | 4 |
| GN 412 Elem. Genetics Lab | 1 |
| PY 208 Physics for Engr. and Sci. II *or* | |
| PY 212 College Physics II | 4 |
| | 16 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 490 Senior Seminar | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physiology Elective[5] | 4-5 |
| Restricted Electives[6] | 7 |
| | 15-16 |

| *Spring Semester* | *Credits* |
|---|---|
| MB 351 General Microbiology | 4 |
| Restricted Elective[6] | 0-3 |
| Free Elective | 9 |
| | 13-16 |

Minimum Hours Required for Graduation ..... 128

Foreign language proficiency at the FL_ 102 level is required for graduation.

[1]Four semester hours of physical education (PE) credit are required for graduation; the first two hours of PE taken may be counted for free elective credit. If a student chooses not to count these first two hours as free elective credit, these hours will not count toward graduation and two additional hours of free elective credit must be completed prior to graduation.

[2]The Humanities and Social Sciences requirements are 21 hours of courses as follows:
A.Two courses from the History and Literature electives lists.
B.One course from the Philosophy, Religion or Visual and Performing Arts electives lists.
C.Two courses from two of the following electives lists: Psychology; Economics; Politics and Government; Sociology; Anthropology; and Cultural Geography.
D.Two courses from any of the above lists or the Humanities and Social Sciences (Additional) list.
E.One of the courses among those elected to fulfill the Humanities and Social Sciences Requirements must focus on a non-English speaking culture.
F.It is suggested that one of the courses elected to fulfill the Humanities and Social Sciences Requirements also come from the Science, Technology, and Society (Humanities and Social Sciences Perspective) list. If not taken as a Humanities and Social Sciences Elective, then a course from this list must be taken as a Restricted or Free Elective.
[3]The Writing and Speaking Elective requirement includes one course from the Advanced Writing Electives list, the Communication/Speech Electives list, or the Foreign Languages Elective list.
[4]Honors students electing ALS 498H typically follow this course with ALS 499H.
[5]Students may elect BO 421, Plant Physiology (4 hrs.), *or* ZO 421, Principles of Physiology (3 hrs.), *or* BO (ZO) 414, Cell Biology (3 hrs.). Note: Students electing ZO 421 or BO (ZO) 414 must also elect either ZO 305, Cellular and Animal Physiology Lab (2 hrs.) *or* BCH 452, Introductory Biochemistry Lab (2 hrs.).
[6]Restricted Electives must be chosen from Groups A, B or C in the CALS section of the Undergraduate Catalog or from the Humanities and Social Sciences Electives on the NC State General Education Lists of Electives.

## NUTRITION CONCENTRATION
### Degree earned: B.S. in Biological Sciences

The Nutrition concentration follows the general curricular requirements for the biological sciences program, except that students must take four courses in nutrition: FS 400, NTR 415, NTR 490, and NTR 516.

## MINOR IN NUTRITION

The minor in Nutrition will provide knowledge of the principles of nutrition that are needed to formulate balanced diets and to evaluate information and policies concerning foods and dietary practitioners. Students may select courses to emphasize human or animal nutrition or a combination of these. For additional information consult Nutrition Program, 236C Schaub Hall (515-2968).

## MINOR IN BIOLOGICAL SCIENCES

The minor in Biological Sciences is open to all interested baccalaureate students with the exception of Zoology and Botany majors, but is intended primarily to enhance the programs of students whose major field is outside the Biological Sciences area. Students pursuing a minor in Biological Sciences will become familiar

with fundamental principles of biology and gain a broad-based perspective of the biological sciences. The minor requires a minimum of 17 credit hours. The minor program is flexible so that students may take courses in areas of individual interest.

## DEPARTMENT OF BOTANY

Gardner Hall, Room 2214

Eric Davies, *Head*

C.G.Van Dyke, *Undergraduate and Director of Graduate Programs*

**Teaching, Research and Extension Faculty**

*University Research Professor:* W.F. Thompson; *Alumni Distinguished Undergraduate Professors:* R.L. Beckmann, C.G. Van Dyke; *Professors*: N.S. Allen, U. Blum, W.F. Boss, W.S. Chilton, R.C. Fites, H.E. Pattee (USDA), J.F. Thomas, C.G. Van Dyke, T.R.Wentworth; *Professors Emeriti*: C.E. Anderson, R.J. Downs, J.W. Hardin, W.W. Heck (USDA), R.L. Mott, G.R.Noggle, E.D.Seneca, J.R.Troyer; *Associate Professors:* R.L.Beckmann, R.S. Boston, J.M. Burkholder, J.E.Mickle, J.M.Stucky; *Assistant Professor*: D.Robertson; *Teaching Technician*: D.S.Wright, *Associate Members of the Faculty*: H.V.Amerson (Forestry), K.O.Burkey (USDA), M.M. Goodman (Crop Science, Statistics, Genetics), M.JGroom (Zoology), S.C. Huber (USDA), T.W. Rufty Jr. (Crop Science), E.C. Sisler (Biochemistry), E.A. Wheeler (Wood and Paper Science); *Adjunct Associate Professor*, C.S. Brown.

The instructional program provides classroom, laboratory, and field experience in the major areas of plant science. Undergraduates majoring in botany are given a broad background in the humanities and physical sciences and are encouraged to participate in independent study in the senior year. Majors, as pre-professionals in the plant sciences, are prepared for advanced study in botany and other biological fields, as well as in the applied plant sciences such as horticulture, crop science, plant pathology, resource management and environmental biology.

### OPPORTUNITIES

The undergraduate degree is an excellent pre-professional degree in the plant sciences. Many majors continue with graduate studies; see list of graduate degrees. After obtaining a graduate degree, the undergraduate major will be qualified for teaching positions in community and junior colleges, colleges and universities, for research positions in federal and state government laboratories and in private industry. Research technician positions in many life science areas in governmental and industrial laboratories are also career possibilities. The field of biotechnology provides additional technical opportunities. Field botanists and naturalists find employment in state and national park systems and nature interpretation programs.

## CURRICULUM

The Bachelor of Science degree with a major in botany is offered under the science curriculum of the College of Agriculture and Life Sciences. See the freshman year program listed. See also other basic requirements listed. The Bachelor of Science degree with double concentration--one in economics, English, history, philosophy or political science, and the other in botany--is available in the College of Humanities and Social Sciences. For details, refer to the appropriate section under the College of Humanities and Social Sciences.

## CURRICULUM IN BOTANY
### Degree earned: B.S. in Botany

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| Humanities/Soc. Sci. Elective[1] | 3 |
| Restricted Elective[2] | 3 |
| Any 100-level PE in Fitness & Wellness[4] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| BAE 121 Computer Applications in ALS *or* | |
| CSC 200 Intro.to Comp. & Use[3] | 3 |
| BO 200 Plant Life | 4 |
| ENG 112 Comp. & Reading | 3 |
| MA 131 Analytic Geom. & Calculus A | 4 |
| Physical Education Elective[4] | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| BO Restricted Course[5] | 4 |
| English, Modern Language[6], or Comm. | 3 |
| Humanities/Soc. Sci. Elective[1] | 3 |
| Restricted Elective[2] | 3 |
| Physical Education Elective[4] | 1 |
| | 18 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ST 311 Intro. to Statistics | 3 |
| BO Restricted Course[5] | 4 |
| Restricted Elective[2] | 3 |
| Free Elective[8] | 3 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BO 495 Special Topics in Botany | 1 |
| CH 220 Intro. Organic Chemistry *or* | |
| CH 221 Organic Chemistry I | 4 |
| ENG 333 Comm. for Sci. & Research | 3 |
| PY 211 College Physics I | 4 |
| Restricted Course[7] | 4 |
| Physical Education Elective[4] | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| PY 212 College Physics II | 4 |
| Botany Restricted Course[5] | 4 |
| Restricted Elective[2] | 3 |
| Free Elective[8] | 3 |
| Free Elective[8] | 3 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| GN 411 Prin. of Genetics | 4 |
| GN 412 Elementary Genetics Lab | 1 |
| BO Restricted Course[5] | 3 |
| Restricted Course[7] | 4 |
| Restricted Elective[2] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 495 Special Topics in Botany | 1 |
| BO Restricted Course[5] | 4 |
| Restricted Course[7] | 4 |
| Free Elective[8] | 3 |
| Free Elective[8] | 2-4 |
| | 14-16 |

Minimum Hours Required for Graduation ..... 128

[1]At least one course must focus on a non-English speaking culture.
[2]Must include one course from HI 321, HI 322, or HI 481; one additional course or equiv. in study of history &/or literature (see GER list); two courses or equivalent from different content areas in study of psychology, economics, politics & government, sociology, anthropology, & cultural geography (see appropriate list), it is recommended that PHI 340 be taken here or as a free elective; one course from Science, Technology, & Society (Humanities/Soc. Sci. Perspective) List.
[3]BAE 121 (focus on IBM compatible systems), CSC 200 (focus on Macintosh systems).
[4]All Physical Education may be taken as credit only. Two (2) hours of PE may be used as free electives.
[5]Must select 18 hrs from BO 360/365, 400, 403, 413, 421, 414, or 480. A 2.000 GPA is required in all Botany courses.
[6]Foreign language proficiency at the FL_ 102 level required for graduation.
[7]Select 12 hours from MB 351, ZO 201, SSC 200 or MEA 101/110, BCH 451/452, CH 223, PP 315, CH 315, ENT 425.
[8]Any course fulfills this requirement; 500 level courses may be taken with permission of the instructor (Graduate credit may be obtained if student qualifies with GPA =/or > 3.200).

# DEPARTMENT OF CROP SCIENCE

Williams Hall, Room 2205

D. A. Knauft, *Head*

J. F. Spears, *Department Extension Leader*

R. P. Patterson, *Undergraduate Coordinator*

R. C. Rufty, *Director of Graduate Programs*

## TEACHING, RESEARCH, AND EXTENSION FACULTY

*Distinguished University Professor:* M. M. Goodman; *Alumni Distinguished Undergraduate Professor:* R. P. Patterson; *William Neal Reynolds Professors*: M. M. Goodman, E. A. Wernsman; *Philip Morris Professor:* G. F. Peedin; *Professors:* J. R. Anderson, D. T. Bowman, A. H. Bruneau, J. C. Burns (USDA), J. W. Burton (USDA), B. E. Caldwell, T E. Carter Jr. (USDA), H. D. Coble, F. T. Corbin, E. J. Dunphy, E. L. Fiscus (USDA), D. S. Fisher (USDA), J. T. Green Jr., S. C. Huber (USDA), R. E. Jarrett, D. A. Knauft, H. M. Linker, R. C. Long, J. E. Miller (USDA), J. P. Mueller, J. P. Murphy, C. H. Peacock, R. C. Rufty, W. D. Smith, H. T. Stalker, J. B. Weber, W. W. Weeks, G. G. Wilkerson, R. F. Wilson (USDA), J. C. Wynne, A. C. York; *Adjunct Professors*: J. R. Evans, K. D. Getsinger, D. G. Oblinger, D. T. Patterson, J. A. Ryals, G. M. Werner, *Professors Emeriti:* R. R. Bennett, C. T. Blake, C. A. Brim, D. S. Chamblee, J. F. Chaplin, W. K. Collins, W. A. Cope, S. H. Dobson, D. A. Emery, W. T. Fike, D. U. Gerstel, W. B. Gilbert, W. C. Gregory, H. D. Gross, G. R. Gwynn, P. H. Harvey, S. N. Hawks, G. L. Jones, G. C. Klingman, J. A. Lee, W. H. Lewis, R. L. Lovvorn, R. P. Moore, D. E. Moreland, A. Perry, L. L. Phillips, J. C. Rice, H. Seltman, G. A. Sullivan, D. L. Thompson, D. H. Timothy, J. A. Weybrew, A. D. Worsham; *Associate Professors:* D. C. Bowman, K. O. Burkey (USDA), D. A. Danehower, R. E. Dewey, T. G. Isleib, S. H. Kay, R. D. Keys, P. Kwanyuen (USDA), D. P. Livingston (USDA), P. H. Sisco (USDA), V. A. Sisson, J. F. Spears, A. K. Weissinger, R. Wells, J. Wilcot; *Associate Professors Emeriti:* R. L. Davis, W. G. Toomey; *Assistant Professors*: K. L. Edmisten, G. P. Fenner, R. W. Heiniger, D. Jordan, J. M. Luginbuhl, R. Qu, P. R. Weisz; *Adjunct Assistant Professor*: M. Fraser; *Extension Specialists:* D. W. Daniel, C. M. Sasscer; *Crop Science*

*Specialists:* S. C. Bennett, C. E. Collins, G. E. Martin; *Associate Members of Faculty:* C. W. Stuber (Genetics), W. F. Thomson, C. T. Young (Food Science); *Visiting Professor*: T. W. Rufty Jr..

Crop Scientists seek to improve the productivity, profitability, and quality of our major food, feed, fiber, and specialty crops; enhance the quality of turf and vegetative cover, enhance our environment, and improve the nutrition and economic health of our world. The Crop Science four-year undergraduate program is offered within the Agronomy curriculum and is administered jointly by the Crop Science and Soil Science Departments. Students may earn a Bachelor of Science degree in the technology curriculum with a major in Agronomy. (See Agronomy Curriculum).

### CAREER OPPORTUNITIES

Agronomy major graduates find employment as consultants, extension agents, farm managers, golf course superintendents, landscape specialists, research scientists, seed production specialists, sod production specialists, soil survey specialists, soil conservationists, technical sales representatives, and waste management specialists. Graduate work can lead to careers in plant breeding, biotechnology, crop physiology and chemistry, and crop management systems. The Agronomy Curriculum can also be found in this catalog under College of Agriculture and Life Sciences. (For Crop Science graduate programs, see the *Graduate Catalog.*)

### CURRICULA

Students may earn a Bachelor of Science degree in the technology curriculum with a major in Agronomy. The Agronomy option is administered jointly by the Departments of Crop Science and Soil Science. See Agronomy Curriculum.

## CURRICULUM IN DAIRY SCIENCE

(See Animal Science)

## DEPARTMENT OF ENTOMOLOGY

Gardner Hall, Room 2301

J. D. Harper, *Head*

J. R. Meyer, *Undergraduate Coordinator*

W. M. Brooks, *Director of Graduate Programs*

P. S. Southern, *Department Extension Leader*

**Teaching, Research and Extension Faculty**

*Alumni Distinguished Undergraduate Professor:* C. G. Wright; *Philip Morris Professor:* J. W. Van Duyn; *William Neal Reynolds Professors:* F. L. Gould, G. G. Kennedy; *Blanton J. Whitmire Professor:* C. Schal; *Professors:* J. T. Ambrose, C. S. Apperson, J. J. Arends, R. C. Axtell, J. S. Bacheler, J. R. Baker, J. R. Bradley Jr., R. L. Brandenburg, W. M. Brooks, L. L. Deitz, F. P. Hain, J. D. Harper, R. J. Kuhr, J. R. Meyer, B. M. Parker, R. M. Roe, K. A. Sorensen, P. S. Southern, R. E. Stinner; *Adjunct Professors:* C. Y. Kawanishi, P. M. Marsh; *Professors Emeriti:* W. V. Campbell, M. H. Farrier, K. L. Knight, W. J. Mistric Jr., H. B. Moore, H. H. Neunzig, R. L. Rabb, R. L. Robertson, C. F. Smith; *Associate Professors:* D. M. Jackson (USDA), J. F. Walgenbach; *Adjunct Associate Professor:* C. Nalepa; *Associate Professor Emeritus:* R. C. Hillmann; *Assistant Professors:* M. E. Barbercheck, D. W. Keever (USDA), B. M. Wiegmann; *Adjunct Associate Professor:* C. Nalepa; *Adjunct Assistant Professor:* R. C. McDonald; *Extension Specialists:* S. B. Bambara, D. L. Stephan, S. M. Stringham, S. J. Toth, M. G. Waldvogel; *Associate Members of the Department: Professors:* W. C. Dauterman (Toxicology), H. M. Linker (Crop Science).

Undergraduate instruction in entomology provides introductory and advanced courses in the basic science of entomology and the management of beneficial and pest insects. 200- and 400-level courses fulfill General Education Requirements in Natural Sciences or Science and Technology and serve students majoring in biological sciences, agronomy, botany, horticultural science, agricultural education, crop science, and forestry. They also provide fundamental training for graduate study in entomology (see the *Graduate Catalog*).

## OPPORTUNITIES

For graduates with advanced degrees in entomology, opportunities include research, teaching, and extension positions in colleges and universities; research, development, production, control, and sales positions in private industries; consultative positions in pest management; curatorial positions in museums; and research and regulatory positions with state and federal agencies.

## CURRICULUM

There is no entomology undergraduate major. Those students with a primary interest in entomology are advised to take the general biological sciences curriculum and the minor in entomology.

## MINOR IN ENTOMOLOGY

The academic minor in Entomology is designed for students interested in insects, their management, and their role in the functioning of natural and agricultural ecosystems. The program requires 15 semester hours. Students must take General Entomology (ENT 425) and 12 additional hours of elective courses. Six of these hours must be additional Entomology courses.

# CURRICULA IN ENVIRONMENTAL SCIENCES

(Also see Interdisciplinary Programs or Physical and Mathematical Sciences)

A.W. Oltmans, *Coordinator,* Economic Policy Concentration
Nelson Hall, Room 233E

H. J. Kleiss, *Coordinator*, Environmental Soil Science Concentration
Williams Hall, Room 2321

S. C. Mozley, *Coordinator,* Ecology Concentration
Gardner Hall, Room 2104

Environmental sciences in the broadest sense are concerned with the development of basic knowledge about the world's environments and the use of this knowledge to create new and more efficient ways to maintain or enhance the environment for society's benefit. Given the complexity of environmental processes and the many ways in which humans interact with natural environments, a multidisciplinary systems approach is essential for understanding changes in natural environments. Society's future prospects for maintaining and improving our environment depends on advances in the sciences, including ecology and soil science, and their application to environmental problems. Realization of these future prospects depends on advances in economics, other social sciences and humanities and the use of these advances to develop and maintain effective economic, political and social structures.

Public concern about environmental issues and the resource costs for protecting our environment are increasing. Protecting and improving our environment involves trade-offs among alternative solutions to specific problems. Therefore, sound knowledge and systematic problem-solving skills will be essential for environmental scientists. Ecologists and other environmental scientists must be conversant with economics, other social sciences, and humanities, while environmental economists and political scientists must be conversant with physical and biological sciences. The explosive growth of knowledge requires that all environmental scientists be competent in the use of mathematical models and statistics. North Carolina State University's environmental science degree program provides sound training in each of these areas. Successful completion of this diverse and challenging program requires a sound academic background and hard work.

To accommodate the complexity and breadth of environmental sciences, the Bachelor of Science degree in environmental sciences is a campus-wide program involving two colleges and five departments that administer six concentrations. A common core of 89 hours provides a balanced foundation in communication, humanities, social sciences, mathematics and the natural sciences. The core requirements include a freshman introductory environmental sciences course and a capstone course for seniors in which teams of students from the various concentrations work together on environmental problems from ecological, physical and economic perspectives.

Three departments within the College of Agriculture and Life Sciences offer environmental sciences concentrations that allow students to specialize in areas within environmental science: Ecology, Economics Policy and Environmental Soil Science. For information on other concentrations, see Marine, Earth and Atmospheric Sciences and Statistics.

## CURRICULUM IN ENVIRONMENTAL SCIENCES, ECOLOGY CONCENTRATION
## Degree earned: B.S. in Environmental Sciences

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| BIO 125 General Biology | 4 | ALS 103 Intro. Topics in ALS | 1 |
| CH 101 General Chemistry I | 3 | CH 107 General Chemistry II | 3 |
| CH 121 General Chemistry I Lab | 1 | CH 127 General Chemistry II Lab | 1 |
| E 115 Intro.to Computing Environments. | 1 | ENG 112 Comp. and Reading | 3 |
| ENG 111 Comp. and Rhetoric | 3 | ES 100 Intro. to Environ. Sci. | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 | MA 241 Analytic Geom. & Calculus II | 4 |
| | 16 | Any 100-level PE in Fitness & Wellness [2] | 1 |
| | | | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 221 Organic Chemistry I | 4 | BO 200 Plant Life | 4 |
| History or Literature Elective[3] | 3 | CH 223 Organic Chemistry II | 4 |
| MA 242 Analytic Geom. & Calculus III | 4 | PY 205 Physics for Engr. & Sci. I | 4 |
| ZO 150 Animal Diversity | 4 | History or Literature Elective[3] | 3 |
| Physical Education Elective[2] | 1 | Physical Education Elective[2] | 1 |
| | 16 | | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BCH 451 Prin. of Biochemistry | 3 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| ST 311 Intro. to Statistics | 3 |
| BO 360 Intro. to Ecology | 3 |
| BO 365 Ecology Lab | 1 |
| Physical Education Elective[2] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 333 Comm. for Sci. & Research | 3 |
| Botany Elective[4] *or* | |
| Restricted Elective[5,6] | 2-4 |
| Communication Elective[7] | 3 |
| Marine Earth & Atmos. Sci. Elective[8] | 3 |
| Marine Earth & Atmos. Sci. Lab Elective[8] | 1 |
| Phil., Relig., Vis/Perf. Arts Elective[3] | 3 |
| | 15-17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 201 Intro.to Agric. & Resr. Economics *or* | |
| EC 201 Intro. to Economics I | 3 |
| GN 411 Prin. of Genetics | 4 |
| ZO 450 Evolutionary Biology | 3 |
| Social Sciences Elective[3,9] | 3 |
| Botany Elective[4] *or* | |
| Restricted Elective[5,6] | 2-4 |
| | 15-17 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE (EC) 336 Intro.to Res. & Env. Economics | 3 |
| ES 400 Environ. Sciences Project[1] | 3 |
| MB 351 General Microbiology | 4 |
| PS 320 U. S. Environ. Law & Politics *or* | |
| PS 336 Global Environ. Politics | 3 |
| Restricted Elective[5,6] | 3-4 |
| | 16-17 |

Minimum Hours Required for Graduation . . . . . 126

**Note:** A minimum grade of C in English 111 and ENG 112, a grade point average of 2.000 in concentration courses, and foreign language proficiency at the FL_ 102 level are required to be eligible for graduation.

[1] New course to be implemented.
[2] Four credit hours of PE (including any 100-level PE in Fitness & Wellness) are required for graduation. The first two PE courses do not count toward minimum hours required for graduation.
[3] One of these courses must focus on a non-English speaking culture.
[4] One of the courses, BO 400 or BO 403, must be chosen.
[5] Theoretical & basic ecology elective, selected from Fall courses BMA(ZO) 567, ENT(ZO) 425, SSC 200, ZO 419, or ZO(BMA) 517 (alt. years), and Spring courses MEA 220 or SSC 200.
[6] Applied ecology elective, selected from Fall courses CS 411, FW(ZO) 353, or FW(ZO) 420, and Spring courses FOR 252, PP 315, SSC 361.
[7] Restricted elective selected from COM 110, COM 112, COM 146, or COM 211.
[8] Restricted elective selected from MEA 101, MEA 130, or MEA 200, and corequisite Lab MEA 110, MEA 135, or MEA 210.
[9] Select from Anthropology, Cultural Geography, Psychology, Sociology and Humanities and Social Sciences Perspectives Electives lists.

# CURRICULUM IN ENVIRONMENTAL SCIENCES, ECONOMIC POLICY CONCENTRATION
## Degree earned: B.S. in Environmental Sciences

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| E 115 Intro.to Computing Environments. | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Any 100-level PE in Fitness & Wellness [1] | 1 |
| Social Science Elective[2,3] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CFR 134 Computers in Natural Resources | 1 |
| CSC 110 Intro.Computing - Pascal *or* | |
| CSC 112 Intro.Computing - Fortran | 3 |
| ENG 112 Comp. & Reading | 3 |
| ES 100 Intro.to Environ. Sci. | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| Physical Education Elective[1] | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 201 Intro.Agric. & Res. Economics *or* | |
| EC 201 Intro. to Economics I | 3 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| ST 301 Statistical Methods I | 3 |
| Physical Education Elective[1] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE (EC) 336 Intro.Res. &Environ. Econ | 3 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ST 302 Statistical Methods II | 3 |
| Communication Elective[5] | 3 |
| History *or* Literature Elective[3] | 3 |
| Physical Education Elective[1] | 1 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE (EC) 301 Intermediate Microeconomics | 3 |
| BO 200 Plant Life *or* | |
| ZO 201 General Zoology | 4 |
| PY 205 Physics for Engr. & Sci. I | 4 |
| ST 430 Intro.to Regression Analysis | 3 |
| History *or* Literature Elective[3] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 332 Comm. for Bus. & Mgmt. *or* | |
| ENG 333 Comm. for Sci. & Research | 3 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| ST 431 Intro.to Exper. Design *or* | |
| ST 432 Intro.to Survey Sampling | 3 |
| Natural Sciences Elective[6] | 4 |
| | 14 |

SENIOR YEAR

| *Fall Semester* | *Credit* |
|---|---|
| ARE (EC) 436 Environ. Economics | 3 |
| EC 410 Public Finance | 3 |
| PS 320 U. S. Environ. Law & Politics *or* | |
| PS 336 Global Environ. Politics | 3 |
| Natural Sciences Elective[6] | 4 |
| Phil., Relig., Vis/Perf. Arts Elective[3] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| EC 302 Intermediate Macroeconomics | 3 |
| ES 400 Environ. Sciences Project Course[4] | 3 |
| ST 445 Stat. Computing & Data Mgmt. | 3 |
| Restricted Elective[7] | 3 |
| | 12 |

Minimum Hours Required for Graduation ..... 120

**Note:** A minimum grade of C in English 111 and ENG 112, a grade point average of 2.000 in all ACC, ARE, BUS, EC and ECG courses attempted, and foreign language proficiency at the FL_102 level are required to be eligible for graduation.

ARE(EC) 336 fulfills the requirement for a Science, Technology and Society (Humanities and Social Science Perspective) elective.

[1]Four credit hours of PE (including any 100-level PE in Fitness & Wellness) are required for graduation. The first two PE courses do not count toward minimum hours required for graduation.
[2]Select from Psychology, Politics & Government, Sociology, Anthropology, and Cultural Geography Electives lists.
[3]One of these courses must focus on a non-English speaking culture.
[4]New course to be implemented.
[5]Select from COM 110, COM 112, COM 146 or COM 211.
[6]Select two of the following four courses and their corequisite laboratories: BO 360/BO 365; MEA 101/MEA 110; MEA 130/MEA 135; MEA 200/MEA 210.
[7]Select from ARE 433, EC 435, ECG 515, ECG 533, ECG 540, or ECG 551.

## CURRICULUM IN ENVIRONMENTAL SCIENCES, ENVIRONMENTAL SOIL SCIENCE CONCENTRATION
## Degree earned: B.S. in Environmental Sciences

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| E 115 Intro. to Computing Environments | 1 |
| ENG 111 Comp. & Rhetoric[1] | 3 |
| MA 141 Analytic Geom. & Calculus | 4 |
| MEA 101 Geology I: Physical | 3 |
| MEA 110 Geology I Lab | 1 |
| Any 100-level PE in Fitness & Wellness[2] | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab. | 1 |
| ENG 112 Comp. & Reading[1] | 3 |
| ES 100 Intro. to Environ. Sciences | 3 |
| MA 241 Analytic Geom. & Calculus. | 4 |
| Physical Education Elective[2] | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 201 Intro.to Agric. and Res. Economics *or* | |
| EC 201 Intro. to Economics I | 3 |
| BO 200 Plant Life | 4 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| Physical Education Elective[2] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 360 Intro. to Ecology | 3 |
| BO 365 Ecology Lab | 1 |
| PY 205 Physics for Engr. and Sci. I | 4 |
| SSC 200 Soil Science | 4 |
| History/Literature[3] | 3 |
| Physical Education Elective[2] | 1 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MEA 493F Practical Hydrogeology *or* | |
| MEA 565 Hydrogeology | 3 |
| PY 208 Physics for Engr. and Sci. II | 4 |
| SSC 341 Soil Fertility and Fertilizers | 3 |
| ST 311 Intro. to Statistics | 3 |
| Comm./Speech Elective[4] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 333 Comm. for Sci. & Research | 3 |
| FOR 353 Air Photo Interp. & Photogram. *or* | |
| NR 300 Natural Resource Measurement *or* | |
| MEA 410 Intro.to Geologic Materials | 3-4 |
| MB 200 Microbiology & World Affairs | 3 |
| SSC 361 Role of Soils in Environ. Mgmt. | 3 |
| SSC 452 Soil Classification | 4 |
| | 16-17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE (EC) 336 Intro.to Res. & Env. Economics | 3 |
| BAE (SSC) 323 Water Mgmt. *or* | |
| FOR 401 Watershed and Wetlands Hydrology | 3-4 |
| BAE (CE) 578 Agricultural Waste Mgmt. *or* | |
| CH 220 Intro. Organic Chemistry *or* | |
| FOR (MDS) 584 Pract. of Environ. Impact Assess. | 3-4 |
| SSC 461 Soil Physical Properties & Plant Growth | 3 |
| History/Literature Elective[3] | 3 |
| | 15-17 |

| *Spring Semester* | *Credits* |
|---|---|
| BAE 471 Land Res. Env. Engr. *or* | |
| SSC 562 Env. Applications of Soil Science | 3 |
| ES 400 Environ. Sciences Project[5] | 4 |
| PS 320 U.S. Environ. Politics *or* | |
| PS 336 Global Environ. Politics | 3 |
| Phil., Relig., Vis/Perf. Arts Elective[3] | 3 |
| Social Science Elective | 3 |
| | 16 |

Minimum Hours Required for Graduation ..... 126

[1]Grade of C or better required in ENG 111 and ENG 112.
[2]Four credit hours of PE required. The first two PE courses do not count toward minimum hours needed for graduation.
[3]One of these courses must come from a list of courses that focus on a non-English speaking culture.
[4]Select from COM 110, COM 112, COM 146 or COM 211.
[5] New course to be implemented.

**Note:** Foreign Language Proficiency at the FL_ 102 level is required for graduation.

# CURRICULA IN FISHERIES AND WILDLIFE SCIENCES

(See curriculum in Fisheries and Wildlife Sciences under the Department of Zoology.)
110 Brooks Avenue

R. L. Noble, *Undergraduate Coordinator*

# DEPARTMENT OF FOOD SCIENCE

Schaub Hall, Room 100

K. R. Swartzel, *Head*

D. R. Ward, *Associate Department Head and Department Extension Leader*

P. M. Foegeding, *Undergraduate Teaching Coordinator*

D. K. Larick, *Graduate Administrator*

### Teaching, Research and Extension Faculty

*William Neal Reynolds Professors:* T. R. Klaenhammer, H. E. Swaisgood, K. R. Swartzel; *Professors:* D. E. Carroll Jr., G. L. Catignani Jr., H. P. Fleming (USDA), E. A. Foegeding, D. D. Hamann, A. P. Hansen, T. C. Lanier,D.K. Larick, R. F. McFeeters (USDA), J. L. Oblinger, D. H. Pilkington, J. E. Rushing, T. H. Sanders (USDA), B. W. Sheldon, S. J. Schwartz, L. G. Turner, W. M. Walter Jr. (USDA), C. T. Young, *Adjunct Professors*: J. P. Adams, N. B. Webb, *Professors Emerti:* L. W. Aurand, H. R. Ball, T. A. Bell Jr., T. N. Blumer, R.E. Carawan, J. A. Christian, E. S. Cofer, H. B. Craig, M. E. Gregory, M. W. Hoover, I. D.

Jones, V. A. Jones, N. C. Miller Jr., A. E. Purcell, W. M. Roberts, M. L. Speck, F. R. Tarver Jr., F. B. Thomas, F. G. Warren; *Associate Professors:* J. C. Allen, L. C. Boyd, P.A. Curtis, D. K. Larick; *Assistant Professors:* B. K. Farkas, D. P. Green, L. Jaykus. *Associate Members of Faculty:* B. K. Garland (Home Economics), A. Hale (Biological and Agricultural Engineering),H.M. Hassan,(Biochemistry, Microbiology,Toxicology) T.J. Hoban (Sociology and Anthropology), F. T. Jones (Poultry Science), C. J. Lackey (Foods and Nutrition); H. E. Pattee (Botany).

The Department of Food Science provides undergraduate and graduate programs for the application and integration of chemistry, biology, and engineering to the development, processing, packaging, quality control, distribution and utilization of safe and nutritious foods. The Food Science B.S. is compatible with pre-professional school curricula; many students elect to double major in Food Science with Biochemistry, Chemical Engineering, Poultry Science or other curricula. Minors in a variety of areas are also encouraged. The department maintains modern, fully-equipped laboratories for teaching and research in the disciplines of food microbiology, food chemistry/biochemistry, food engineering,and nutrition; and the product areas of dairy, fruit, meats, poultry, seafood and vegetable products. Departmental programs address food safety, value-added food processing, environmental impact of food processing, and nutritional health. Food Science includes the most current information related to biotechnology, engineering approaches and computer applications as they relate to providing safe foods with minimal impact on the environment.

## OPPORTUNITIES

Increasing consumer concern regarding food safety and demands for greater varieties of nutritious and convenient foods of uniformly high quality create many varied career opportunities in the food and allied industries. Career opportunities in food industries include management, research and development, process supervision, quality control, procurement, distribution, and sales and merchandising. Positions include sales and services in allied industries, consulting and trade association activities, and promotional and educational services. Food Science graduates hold teaching, research and extension positions with colleges and universities. Governmental agencies employ food scientists whose work is directed toward research, regulatory control and the development of food standards.

The food industry provides both merit and financial need scholarships to encourage students preparing for careers in Food Science. Phi Tau Sigma invites outstanding seniors to membership, and all students are encouraged to participate in the Food Science Club, a student branch of the Institute of Food Technologists.

## CURRICULA

The Bachelor of Science degree with a major in Food Science is offered through curricula with a science emphasis or a technology emphasis. The science program is designed for students with interest in graduate school or for those desiring more rigorous science courses for technical careers in the food industry. Students more interested in business opportunities for technically trained individuals find the technology program permits greater flexibility in complementing Food Science coursework with business, agricultural commodity and computer science courses.

## SCIENCE CURRICULUM IN FOOD SCIENCE
### Degree earned: B.S. in Food Science

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 107 Precalculus I | 3 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| FS 201 Food Science & the Consumer | 3 |
| MA 131 Analytic Geom. & Calculus A | 4 |
| Physical Education Elective[1] | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| FS 290 Preparing for Careers in Food Science | 1 |
| MA 231 Analytic Geom. & Calculus B | 3 |
| PY 211 College Physics I | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 221 Organic Chemistry I | 4 |
| FS 231 Food Engineering | 4 |
| PY 212 College Physics II | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 15 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| FS 402 Food Chemistry | 3 |
| ST 311 Intro. to Statistics | 3 |
| Communication Elective[3] | 3 |
| Food Science Elective[4] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BCH 451 Prin. of Biochemistry | 4 |
| FS 400 Prin. of Human Nutrition | 3 |
| MB 351 General Microbiology | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| FS 403 Food Analysis | 3 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| FS (MB) 405 Food Microbiology | 3 |
| FS (MB) 406 Food Microbiology Lab | 1 |
| FS 421 Food Preservation | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Free Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| Food Science Elective[4] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| FS 475 Prob & Design in Food Science | 3 |
| Free Elective | 6 |
| Physical Education Elective[1] | 1 |
| | 16 |

Minimum Hours Required for Graduation ..... 126[5]

[1]Any PE 100 level course for Fitness & Wellness and three additional credits of PE activity courses are required.
[2]These courses must be selected from the approved GER listing for Humanities and Social Sciences as follows:
**6 credits** in history and/or literature, **3 credits** from philosophy, religion or visual and performing arts, **6 credits** from two different areas in psychology, economics, politics and government, sociology, anthropology or cultural geography, **3 credits** of science technology and society from a humanities and social science perspective. The final 3 credits may be from any courses in the aforementioned categories. At least **1 course** in the Humanities and Social Sciences must focus on a non-English speaking culture.
[3]Course must be selected from the approved GER Communication Electives List.
[4]A total of 33 credits of Food Science are required.
[5]Students must have demonstrated foreign language proficiency at the FI 102 level.

## TECHNOLOGY CURRICULUM IN FOOD SCIENCE
## Degree earned: B.S. in Food Science

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 111 Comp. & Rhetoric | 3 |
| MA 107 Precalculus I | 3 |
| Communication Elective[1] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Free Elective[3] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 114 Intro. to Finite Math. Applic. *or* | |
| MA 131 Analytic Geom. & Calculus A | 3-4 |
| Any 100-level PE in Fitness & Wellness[4] | 1 |
| Free Elective[3] | 3 |
| | 15-16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| FS 201 Food Science & the Consumer | 3 |
| FS 290 Preparing for Careers in Food Science | 1 |
| MA 121 Elements of Calculus *or* | |
| MA 231 Analytic Geom. & Calculus B | 3-4 |
| PY 211 College Physics I | 4 |
| | 15-16 |

| *Spring Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| CH 220 Intro. Organic Chemistry *or* | |
| CH 221 Organic Chemistry I | 4 |
| FS 231 Food Engineering | 4 |
| FS 322 Muscle Foods & Egg *or* | |
| FS 324 Milk & Dairy Products | 2-3 |
| | 14-15 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry *or* | |
| Free Elective[3] | 4 |
| FS 402 Food Chemistry | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Advised Elective[3] | 3 |
| Physical Education Elective[4] | 1 |
| | 14 |

| *Spring Semester* | *Credits* |
|---|---|
| FS 403 Food Analysis | 3 |
| MB 351 General Microbiology | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Advised Elective[3] | 3 |
| Food Science Elective[5] | 2-3 |
| Physical Education Elective[4] | 1 |
| | 16-17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| FS (MB) 405 Food Microbiology | 3 |
| FS (MB) 406 Food Microbiology Lab | 1 |
| FS 421 Food Preservation | 3 |
| Humanities/Soc. Sci. Elective[2] | 6 |
| Advised Elective[3] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| FS 416 Quality Control Food Products | 3 |
| FS 475 Problems and Design in Food Science | 3 |
| Humanities/Soc. Sci. Elective[2] | 6 |
| Free Elective[3] | 3 |
| Physical Education Elective[4] | 1 |
| | 16 |

Minimum Hours Required for Graduation ..... 123[6]

[1]Course must be selected from the approved GER Communication Electives List.
[2]These courses must be selected from the approved GER listing for Humanities and Social Sciences as follows:
**6 credits** in history and/or literature, **3 credits** from philosophy, religion or visual and performing arts, 6 **credits** from two different areas in psychology, economics, politics and government, sociology, anthropology or cultural geography, **3 credits** of science technology and society from a humanities and social science perspective. The final three credits may be from any courses in the aforementioned categories. At least 1 **course** in the Humanities and Social Sciences must focus on a non-English speaking culture.
[3]Nine credits of Business or Economics must be included or the student must complete a minor in any field of their choosing. If the Business/Economics option is elected, EC 201 or ARE 201 is required. Six additional credits of Business and Economics electives should be selected from the following: ARE 306, ARE 311, ARE 312, ARE 423, ARE 433, BUS 305, BUS 307, BUS 308, BUS 320, BUS 330, BUS 332, BUS 346, BUS 360, BUS 420, BUS 462, BUS 464, BUS 465, EC 202, EC(ARE) 301, EC 302, EC(BUS) 310, EC(ARE) 336, EC(ARE) 401, EC(BUS) 404, EC 431, EC(ARE) 436, EC 448, EC(BUS) 449 If a minor is chosen, advised electives and free electives may be used to fulfill the minor requirements. Most minors require 15 to 21 credits.
[4]Any 100 level PE course for Fitness & Wellness and three additional credits of PE activity courses are required.
[5]A total of 33 credits of Food Science are required.
[6]Students must have demonstrated foreign language proficiency at the FI 102 level.

## MINOR IN FOOD SCIENCE

The minor in Food Science is designed to provide important food science principles and concepts to students seeking to improve their understanding of food and food processing and especially to those seeking employment as chemists, microbiologists, engineers, nutritionists, business specialists, or technical writers in the food or pharmaceutical industry. One introductory course (FS 201) is required, and 12 additional hours at the 300 or 400 level may be selected to complement a variety of majors.

# DEPARTMENT OF GENETICS

Gardner Hall, Room 3513

S. E. Curtis, *Head*

W. R. Atchley, *Director of Graduate Programs*

W. H. McKenzie, *Undergraduate Teaching Coordinator and Undergraduate Minor Administrator*

**Teaching, Research and Extension Faculty**

*Alumni Distinguished Undergraduate Professor:* W. H. McKenzie; *William Neal Reynolds Professors:* W. R. Atchley, T. F. C Mackay; *Distinguished University Professor:* J. G. Scandalios; *Professors:* S. E. Curtis, W. E. Kloos, H. E. Schaffer, S. L. Spiker, C. W. Stuber (USDA); *Adjunct Professor:* M. D. Chilton; *Professors Emeriti:* C. H. Bostian, W. D. Hanson, C. S. Levings, T. J. Mann, D. F. Matzinger, R. H. Moll, A. C. Triantaphyllou; *Associate Professors:* M. T. Andrews, M.A. Conkling, T. H. Emigh, J. W. Mahaffey; *Assistant Professors:* J. C. Swaffield, M. D. Purugganan; *Adjunct Assistant Professor:* L. Smith; *Associate Members of the Faculty:* E. J. Eisen, B. T. McDaniel, R. M. Petters, O. W. Robison (Animal Science); L. Hanley-Bowdoin (Biochemistry); R. S. Boston, W. F. Thompson (Botany); E. A. Wernsman (Crop Science); M.M. Goodman (Crop Science, Statistics, Botany); R. R. Sederoff (Forestry; Biochemistry); C. H. Opperman (Plant Pathology); B. S. Weir, J. L. Thorne, S. B. Zeng (Statistics).

The Department of Genetics offers courses at the advanced undergraduate and graduate levels. Undergraduate students interested in genetics are encouraged to pursue a genetics minor (see below) in conjunction with a major in one of the basic biological or agricultural sciences. An undergraduate major in genetics is not available. The graduate program is designed to train scientists for research and teaching careers in genetics and molecular biology. Please refer to the *Graduate Catalog* for further information concerning the M.S. and Ph.D. degrees in genetics.

## MINOR IN GENETICS

The Department of Genetics offers an undergraduate minor in genetics to provide students with strong preparation in the principles of genetics as well as preparation in ancillary fields such as statistics, biochemistry and microbiology. This minor is appropriate for (but not limited to) students with majors in animal science, biochemistry, biological sciences, botany, crop science, conservation, entomology, fisheries and wildlife sciences, forestry, horticultural science, microbiology, poultry science, and zoology. The genetics minor requires 18 credit hours - 15 specified and 3 elective. A grade of C or better is required for all courses to fulfill the genetics minor requirements.

# DEPARTMENT OF HORTICULTURAL SCIENCE

Kilgore Hall, Room 114

T.J. Monaco, *Head*

B.H. Lane, *Undergraduate Coordinator*. E-mail: Bryce_Lane@ncsu.edu

D.J. Werner, *Director of Graduate Programs*. E-mail: Dennis_Werner@ncsu.edu

**Teaching, Research and Extension Faculty**

*Alumni Distinguished Undergraduate Professor*: B.H. Lane; *Alumni Distinguished Graduate Professor*: D.M. Pharr; *Professors*: J.R. Ballington Jr., T.E. Bilderback, S.M. Blankenship, F.A. Blazich, W.W. Collins, A.A. De Hertogh, P.R. Fantz, W.C. Fonteno, R.G. Gardner, L.E. Hinesley, W.E. Hooker, T.J. Monaco, P.V. Nelson, M.M. Peet, K.B. Perry, E.B. Poling, M.A. Powell Jr., J.C. Raulston, D.C. Sanders, C.R. Unrath, S.L. Warren, T.C. Wehner, D.J. Werner, J.H. Wilson Jr., L.G. Wilson; *Adjunct Professor*: P.S. Zorner (Mycogen Corp.); *Professors Emeriti*: W.E. Ballinger, A.A. Banadyga, J.F. Brooks Jr., F.D. Cochran, H.M. Covington, J.H. Harris, F.L. Haynes Jr., W.R. Henderson, G.R. Hughes, J.M. Jenkins, T.R. Konsler, R.A. Larson, J.W. Love, C.M. Mainland, C.H. Miller, D.T. Pope, W.A. Skroch; *Associate Professors*: D.A. Bailey, J.D. Burton, S.D. Clouse, J.M. Davis, D.W. Monks, J.C. Neal, M.L. Parker, T.G. Ranney, J.R. Schultheis; *Adjunct Associate Professor*: F.C. Wise (Westvaco Corp.); *Associate Professors Emeriti*: T.F. Cannon, W.W. Reid, D.C. Zeiger; *Assistant Professors*: N.G. Creamer, G.E. Fernandez, A.R. Okigbo; *Research Assistant Professor*: J.D. Williamson; *Visiting Assistant Professor*: G.C. Yencho; *Lecturer*: M.E. Traer; *Researcher*: J.A. Huber, S.D. Rooks; *Extension Specialists*: L. Bass, R.E. Bir, A.B. Russell; *Extension Associates*: E.D. Evans, W.E. Mitchem; *Associate Members of the Faculty*: D.E. Carroll Jr. (Food Science), R.J. Volk (Soil Science).

Horticulture is a dynamic segment of agriculture. The development, growth, distribution, and utilization of fruits, vegetables, flowers and ornamental plants plus the arts of floral design and landscaping enrich our lives with nutritious foods and more attractive surroundings. North Carolina's varied climatic conditions favor the production of a wide variety of horticultural crops on a commercial scale, as well as the development of parks and gardens. The population and amount of industry in the state are increasing, and with them the use of ornamental plants. Designers skilled in residential and commercial landscaping, interior plantscaping, and plant maintenance are in high demand. All this in turn has created a growth in interest in horticulture education.

Undergraduate programs in horticultural science offer a broad based education in physical and biological sciences and a sound cultural background. Students can concentrate in areas of fruit and vegetable science, floriculture, woody ornamental plant science, landscape horticulture, or pursue a general approach which encompasses all the specialties. They are prepared for graduate study or for diverse professional service.

## OPPORTUNITIES

Horticulture graduates fill positions in production, processing, sales and service. Among these are county extension agents; vocational agricultural teachers; landscapers and landscape contractors; farm operators; orchard, nursery, greenhouse and garden center managers; research, production and promotional specialists with commercial seed, floral, fertilizer, chemical and food companies; inspectors and quality control technologists; USDA specialists and leaders in other phases of agricultural and industrial developments. The student may also prepare for a career in research, teaching, or extension in horticulture.

## CURRICULA

The degree of Bachelor of Science with a major in horticultural science can be earned in either science or technology. Under the science curriculum, specialized education is offered in fruit and vegetable crops, floriculture, and ornamental horticulture. Under the technology curriculum, education is offered in landscape horticulture or in a general approach which includes all the commodity areas.

## SCIENCE CURRICULUM IN HORTICULTURAL SCIENCE, FLORICULTURE CONCENTRATION

### Degree earned: B.S. in Horticultural Science

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 107 Precalculus I | 3 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| HS 201 Prin. of Horticulture | 3 |
| MA 121 Elements of Calculus *or* | |
| MA 131 Analytic Geom. & Calculus A. | 4 |
| Physical Education Elective[2] | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BO 200 Plant Life | 4 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| HS 290 Perspectives in Horticultural Science. | 1 |
| PY 211 College Physics I | 4 |
| Free Elective | 3 |
| Physical Education Elective[2] | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 221 Organic Chemistry I | 4 |
| HS 212 Ornamental Plants II | 3 |
| SSC 200 Soil Science | 4 |
| PY 212 College Physics II | 4 |
| Physical Education Elective[2] | 1 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| ENT 425 General Entomology | 3 |
| HS 301 Plant Propagation | 4 |
| HS 440 Greenhouse Mgmt. | 3 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 421 Plant Physiology | 4 |
| PP 315 Prin. of Plant Pathology *or* | |
| PP 318 Forest Pathology [5] | 4 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| Writing/Speaking Elective[4] | 3 |
| Free Elective | 3 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| GN 411 Prin. of Genetics | 4 |
| GN 412 Elementary Genetics Lab | 1 |
| HS 441 Floriculture I | 3 |
| Humanities/Soc. Sci. Elective[3] | 6 |
| Free Elective | 2 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BCH 451 Prin. of Biochemistry | 4 |
| HS 442 Floriculture II | 3 |
| Humanities/Soc. Sci. Elective[3] | 6 |
| Free Elective | 2 |
| | 15 |

Minimum Credit Hours Required for Graduation ..... 128[6]

[1] Students may choose from any PE 100 level course in Fitness & Wellness.

[2] Four semester hours of physical education (PE) are required for graduation; the first two hours of PE taken may be counted for free elective. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free elective must be completed.

[3] The Humanities and Social Sciences Requirements are 21 hours of courses as follows:

A. One course from History Electives List and one course from Literature Electives List.
B. One course from Philosophy Electives, Religion Electives, and Visual and Performing Arts Electives List.
C. One course from the Economics Elective List and one course from the following Elective Lists: Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography.
D. Two courses from any of the above lists or the Humanities and Social Sciences (Additional) List.
E. One of the courses among those elected to fulfill the Humanities and Social Sciences Requirements must focus on a non-English speaking culture.
F. It is suggested that one of the courses elected to fulfill the Humanities and Social Sciences Requirements also come from the Science, Technology, and Society (Humanities and Social Science Perspective) List. If not taken as a Humanities and Social Sciences Elective, then a course from this List must be taken as a Free Elective.

[4] The Writing and Speaking Elective Requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.

[5] PP 315 and PP 318 offered Fall and Spring semester, respectively. Only one course required.

[6] Language proficiency at FL_102 level is required for graduation.

# SCIENCE CURRICULUM IN HORTICULTURAL SCIENCE, FRUITS AND VEGETABLE CONCENTRATION

## Degree earned: B.S. in Horticultural Science

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 107 Precalculus I | 3 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| HS 201 Prin. of Horticulture | 3 |
| MA 121 Elements of Calculus *or* | |
| MA 131 Analytic Geom. & Calculus A. | 4 |
| Physical Education Elective[2] | 1 |
| | 15 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BO 200 Plant Life | 4 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| HS 290 Perspectives in Hort. Sci. | 1 |
| PY 211 College Physics I | 4 |
| Free Elective | 3 |
| Physical Education Elective[2] | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 221 Organic Chemistry I | 4 |
| PY 212 College Physics II | 4 |
| SSC 200 Soil Science | 4 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| Physical Education Elective[2] | 1 |
| | 16 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| ENT 425 General Entomology | 3 |
| HS 431 Vegetable Production | 4 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| Free Elective | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 421 Plant Physiology | 4 |
| PP 315 Prin. of Plant Pathology *or* | |
| PP 318 Forest Pathology[6] | 4 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| Writing/Speaking Elective[4] | 3 |
| Free Elective | 3 |
| | 17 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| GN 411 Prin. of Genetics | 4 |
| GN 412 Elementary Genetics Lab | 1 |
| HS 421 Physiology of Tree Fruits | 3 |
| Departmental Elective[5] | 3 |
| Humanities/Soc. Sci. Elective[3] | 6 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| BCH 451 Prin. of Biochemistry | 4 |
| HS 422 Small Fruit Production | 3 |
| HS 462 Postharvest Physiology | 3 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| Free Elective | 1 |
| | 14 |

Minimum Credit Hours Required for Graduation ..... 128[7]

[1] Students may choose from any PE 100 level course in Fitness & Wellness.

[2] Four semester hours of physical education (PE) are required for graduation; the first two hours of PE taken may be counted for free elective. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free elective must be completed.

[3] The Humanities and Social Sciences Requirements are 21 hours of courses as follows:
A. One course from History Electives List and one course from Literature Electives List.
B. One course from Philosophy Electives, Religion Electives, and Visual and Performing Arts Electives List.
C. One course from the Economics Elective List and one course from the following Elective Lists: Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography.
D. Two courses from any of the above Lists or the Humanities and Social Sciences (Additional) List.
E. One of the courses among those elected to fulfill the Humanities and Social Sciences Requirements must focus on a non-English speaking culture.
F. It is suggested that one of the courses elected to fulfill the Humanities and Social Sciences Requirements also come from the Science, Technology, and Society (Humanities and Social Science Perspective) List. If not taken as a Humanities and Social Sciences Elective, then a course from this List must be taken as a Free Elective.

[4] The Writing and Speaking Elective Requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.

[5] Students may choose one from the following list of courses to fulfill the Department Elective Requirement (see THG, footnote 7).

[6] PP 315 and PP 318 offered Fall and Spring semester, respectively. Only one course required.

[7] Language proficiency at FL_102 level is required for graduation.

## TECHNOLOGY CURRICULUM IN HORTICULTURAL SCIENCE, GENERAL HORTICULTURE CONCENTRATION
## Degree earned: B.S. in Horticultural Science

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 107 Precalculus I | 3 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 200 Plant Life | 4 |
| ENG 112 Comp. & Reading | 3 |
| MA 114 Intro. to Finite Math Applic. *or* | |
| MA 121 Elements of Calculus *or* | |
| MA 131 Analytic Geom. & Calculus A. | 3 - 4 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| Physical Education Elective[2] | 1 |
| | 14 - 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| HS 211 Ornamental Plants I *or* | |
| Free Elective | 3 |
| HS 290 Perspectives in Horticultural Science. | 1 |
| HS 301 Plant Propagation | 4 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| Physical Education Elective[2] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| HS 212 Ornamental Plants II *or* | |
| Free Elective | 3 |
| PY 131 Conceptual Physics | 4 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| Physical Education Elective[2] | 1 |
| | 15 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ANS/HS 215 Basic Agricultural Genetics | 3 |
| ENT 425 General Entomology | 3 |
| HS 431 Vegetable Production | 4 |
| HS 440 Greenhouse Mgmt. | 3 |
| SSC 200 Soil Science. | 4 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 421 Plant Physiology | 4 |
| HS 442 Floriculture II | 3 |
| PP 315 Prin. of Plant Pathology *or* | |
| PP 318 Forest Pathology[6] | 4 |
| ARE/BUS Elective I[4] | 3 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| HS 411 Nursery Mgmt. | 3 |
| HS 421 Physiology of Tree Fruits *or* | |
| Humanities/Soc. Sci. Elective[3] | 3 |
| ARE/BUS Elective II[4] | 3 |
| Writing/Speaking Elective[5] | 3 |
| Free Elective | 5-6 |
| | 17-18 |

| *Spring Semester* | *Credits* |
|---|---|
| HS 422 Small Fruit Production *or* | |
| Humanities/Soc. Sci. Elective[3] | 3 |
| HS 462 Postharvest Physiology | 3 |
| HS 471 Tree & Grounds Maintenance | 4 |
| Departmental Elective[7] | 3 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| | 16 |

Minimum Credit Hours Required for Graduation ..... 128[8]

[1] Students may choose from any PE 100 level course in Fitness & Wellness.

[2] Four semester hours of physical education (PE) are required for graduation; the first two hours of PE taken may be counted for free elective. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free elective must be completed.

[3] The Humanities and Social Sciences Requirements are 21 hours of courses as follows:

A. One course from History Electives List and one course from Literature Electives List.
B. One course from Philosophy Electives, Religion Electives, and Visual and Performing Arts Electives List.
C. One course from the Economics Elective List and one course from the following Elective Lists: Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography. Students are encouraged to complete the Economic Elective before the end of the sophomore year.
D. Two courses from any of the above Lists or the Humanities and Social Sciences (Additional) List.
E. One of the courses among those elected to fulfill the Humanities and Social Sciences Requirements must focus on a non-English speaking culture.
F. It is suggested that one of the courses elected to fulfill the Humanities and Social Sciences Requirements also come from the Science, Technology, and Society (Humanities and Social Science Perspective) List. If not taken as a Humanities and Social Sciences Elective, then a course from this List must be taken as a Free Elective.

[4] Students are required to take a minimum of 9 hours of coursework in Economics and Business; one course in economic principles (see item C footnote 3 above), one course in management or marketing (ARE/BUS Elective I), and one course from a set of business and economic courses (ARE/BUS Elective II). Students may choose from the following lists.

ARE/BUS Elective I List (Select 1)

ARE 303 Farm Management
ARE 304 Agribusiness Management (currently ARE 495M)
ARE 311 Agricultural Markets
ARE 312 Agribusiness Marketing

ARE/BUS Elective II (Select 1)

ACC 280 Managerial Accounting
ARE 303 Farm Bus. Management
ARE 304 Agribusiness Management (currently ARE 495M)
ARE 306 Agricultural Law

ARE 309 Environmental Law and Economic Policy
ARE 311 Agricultural Markets
ARE 312 Agribusiness Marketing
ARE 321 Agricultural Financial Management
BUS 307 Bus. Law I
BUS 320 Financial Management
BUS 330 Human Resource Management
BUS 360 Marketing Methods

[5] The Writing and Speaking Elective Requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.
[6] PP 315 and PP 318 offered Fall and Spring semester, respectively. Only one course required.
[7] Students may choose one from the following list of courses to fulfill the Department Elective Requirement:

HS 211 Ornamental Plants I
HS 212 Ornamental Plants II
HS 342 Landscape Horticulture
HS 371 Interior Plantscapes
HS 421 Physiology and Culture of Temperate-Zone Tree Fruits
HS 422 Small Fruit Production
HS 441 Floriculture I
HS 492 External Learning Experience
HS 493 Special Problems in Horticultural Science
HS 531 Physiology of Landscape Plants

[8] Language proficiency at FL 102 is required for graduation.

## TECHNOLOGY CURRICULUM IN HORTICULTURAL SCIENCE, LANDSCAPE HORTICULTURE CONCENTRATION
## Degree earned: B.S. in Horticultural Science

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General. Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 107 Precalculus I | 3 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 200 Plant Life | 4 |
| ENG 112 Comp. & Reading | 3 |
| HS 201 Prin. of Horticulture | 3 |
| LAR 234 Intro. to Environ. Design | 3 |
| MA 114 Intro. to Finite Math. Appl. *or* MA 121 Elements of Calculus *or* MA 131 Analytic Geom. & Calculus A. | 3-4 |
| Physical Education Elective[2] | 1 |
| | 17-18 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 101 General Chemistry I | 3 | BO 360 Intro. to Ecology | 3 |
| CH 121 General Chemistry I Lab | 1 | BO 365 Ecology Lab | 1 |
| HS 211 Ornamental Plants I | 3 | CH 107 General Chemistry II | 3 |
| HS 290 Perspectives in Hort. Sci. | 1 | CH 127 General Chemistry II Lab | 1 |
| Humanities/Soc. Sci. Elective[3] | 6 | HS 212 Ornamental Plants II | 3 |
| Physical Education Elective[2] | 1 | HS 342 Landscape Horticulture | 3 |
| | 15 | Physical Education Elective[2] | 1 |
| | | | 15 |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| LAR 430 Site Planning | 3 | HS 400 Resident. Landscaping | 6 |
| PY 131 Conceptual Physics | 4 | LAR 457 Landscape Const. Materials. Methods & Doc | 3 |
| SSC 200 Soil Science | 4 | PP 315 Prin. of Plant Pathology *or* | |
| Humanities/Soc. Sci. Elective[3] | 3 | PP 318 Forest Pathology[5] | 4 |
| Writing/Speaking Elective[4] | 3 | Humanities/Soc. Sci. Elective[3] | 3 |
| | 17 | | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ENT 425 General Entomology | 3 | BO 421 Plant Physiology | 4 |
| HS 411 Nursery Mgmt. | 3 | HS 416 Prin. Orn. Plant Design | 3 |
| LAR 400 Landscape Arch. Studio | 6 | HS 471 Tree & Grounds. Maintenance | 4 |
| Humanities/Soc. Sci. Elective[3] | 3 | Humanities/Soc. Sci. Elective[3] | 3 |
| | 15 | Free Elective | 3-4 |
| | | | 17-18 |

Minimum Credit Hours Required for Graduation ..... 128[6]

[1] Students may choose from any PE 100 level course in Fitness & Wellness.

[2] Four semester hours of physical education (PE) are required for graduation; the first two hours of PE taken may be counted for free elective. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free elective must be completed.

[3] The Humanities and Social Sciences Requirements are 21 hours of courses as follows:

A. One course from History Electives List and one course from Literature Electives List.
B. One course from Philosophy Electives, Religion Electives, and Visual and Performing Arts Electives List.
C. One course from the Economics Elective List and one course from the following Elective Lists: Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography.
D. Two courses from any of the above Lists or the Humanities and Social Sciences (Additional) List.
E. One of the courses among those elected to fulfill the Humanities and Social Sciences Requirements must focus on a non-English speaking culture.
F. It is suggested that one of the courses elected to fulfill the Humanities and Social Sciences Requirements also come from the Science, Technology, and Society (Humanities and Social Science Perspective) List. If not taken as a Humanities and Social Sciences Elective, then a course from this List must be taken as a Free Elective.

[4] The Writing and Speaking Elective Requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.

[5] PP 315 and PP 318 offered Fall and Spring semester, respectively. Only one course required.

[6] Language proficiency at FL_102 is required for graduation.

# SCIENCE CURRICULUM IN HORTICULTURAL SCIENCE, SCIENCE ORNAMENTALS CONCENTRATION
## Degree earned: B.S. in Horticultural Science

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 107 Precalculus I | 3 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| HS 201 Prin. of Horticulture | 3 |
| MA 121 Elements of Calculus *or* | |
| MA 131 Analytic Geom. & Calculus A. | 4 |
| Physical Education Elective[2] | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BO 200 Plant Life | 4 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| HS 211 Ornamental Plants I | 3 |
| HS 290 Perspectives in Hort. Sci. | 1 |
| PY 211 College Physics I | 4 |
| Physical Education Elective[2] | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 221 Organic Chemistry I | 4 |
| HS 212 Ornamental Plants II | 3 |
| PY 212 College Physics II | 4 |
| SSC 200 Soil Science | 4 |
| Physical Education Elective[2] | 1 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| ENT 425 General Entomology | 3 |
| HS 301 Plant Propagation | 4 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| Free Elective | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 421 Plant Physiology | 4 |
| PP 315 Prin. of Plant Pathology *or* | |
| PP 318 Forest Pathology[5] | 4 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| Writing/Speaking Elective[4] | 3 |
| Free Elective | 3 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| GN 411 Prin. of Genetics | 4 |
| GN 412 Elementary Genetics Lab | 1 |
| HS 411 Nursery Mgmt. | 3 |
| Humanities/Soc. Sci. Elective[3] | 6 |
| Free Elective | 2 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BCH 451 Prin. of Biochemistry | 4 |
| HS 471 Tree and Grounds Maintenance | 4 |
| Humanities/Soc. Sci. Elective[3] | 6 |
| Free Elective | 1 |
| | 15 |

Minimum Credit Hours Required for Graduation ..... 128[6]

[1] Students may choose from any PE 100 level course in Fitness & Wellness.

[2] Four semester hours of physical education (PE) are required for graduation; the first two hours of PE taken may be counted for free elective. If a student chooses not to count these first two hours as free elective, these hours will not count toward graduation and two additional hours of free elective must be completed.

[3] The Humanities and Social Sciences Requirements are 21 hours of courses as follows:
A. One course from History Electives List and one course from Literature Electives List.
B. One course from Philosophy Electives, Religion Electives, and Visual and Performing Arts Electives List.
C. One course from the Economics Elective List and one course from the following Elective Lists: Psychology, Politics and Government, Sociology, Anthropology, and Cultural Geography.
D. Two courses from any of the above Lists or the Humanities and Social Sciences (Additional) List.
E. One of the courses among those elected to fulfill the Humanities and Social Sciences Requirements must focus on a non-English speaking culture.
F. It is suggested that one of the courses elected to fulfill the Humanities and Social Sciences Requirements also come from the Science, Technology, and Society (Humanities and Social Science Perspective) List. If not taken as a Humanities and Social Sciences Elective, then a course from this List must be taken as a Free Elective.

[4] The Writing and Speaking Elective Requirement includes one course from the Advanced Writing Electives List or the Communication/Speech Electives List.

[5] PP 315 and PP 318 offered Fall and Spring semester, respectively. Only one course required.

[6] Language proficiency at FL_102 level is required for graduation.

### MINOR IN HORTICULTURAL SCIENCE

The academic minor in Horticultural Science is offered to students who desire a strong foundation in the principles of horticultural science. Students may choose to enhance their own major by selecting courses in a specialized area of horticulture such as fruits and vegetables, ornamentals, floriculture, or landscape horticulture, or they may pursue a more general approach to the entire field of study. Sixteen or seventeen credit hours are required for the minor, depending on courses selected.

## CURRICULUM IN MEDICAL TECHNOLOGY

(See Science Program in Medical Technology under Department of Zoology.)
Gardner Hall, Room 1627

J. F. Roberts, *Undergraduate Coordinator*

## DEPARTMENT OF MICROBIOLOGY

Gardner Hall, Room 4515

H. M. Hassan, *Head*

G. H. Luginbuhl, *Undergraduate Coordinator*

T. Melton, *Director of Graduate Programs*

**Teaching, Research and Extension Faculty**

*Alumni Distinguished Undergraduate Professor,* G. H. Luginbuhl; *Professors:* P. E. Bishop (USDA), W. J. Dobrogosz, L. W. Parks, J. J. Perry; *Professor Emeritus:* G. H. Elkan; *Adjunct Professors:* C. R. Bunn, I. A. Casas, R. E. Kanich, S. R. Tove; *Associate Professors:* J. M. Mackenzie, T. Melton, E. S. Miller; *Adjunct Associate Professor:* K. T. Kleeman; *Assistant Professors:* J. W. Brown, S. M. Laster, I. T. D. Petty; *Adjunct Assistant Professors:* W. S. Dallas, S. H. Shore; *Teaching Technician:* W. P. Crumpler, V. M. Knowlton; *Lab Supervisor:* T. J. Schneeweis; *Associate Members of the Faculty:* P. M. Foegeding (Food Science), F. J. Fuller (Veterinary Medicine), T. R. Klaenhammer (Food Science), W. E. Kloos (Genetics), J. C. H. Shih (Poultry Science).

The microbiology program provides basic preparation in microbiology and immunology for professional microbiologists and students in other sciences and an awareness of the microbial world as it relates to our daily lives for non-science majors.

Microbiology is concerned with the growth and development, physiology, classification, ecology, genetics and other aspects of the life processes of an array of microscopic, generally single-celled, organisms and viruses. These organisms frequently serve as model systems for elucidation of fundamental processes that are common to all living cells. Most of the major discoveries that have produced the spectacular advances in biology during the past decade have resulted from studies of microbial systems. Future developments in biotechnology, production of food and fuel, and human and animal health will rely heavily on understanding microbial processes.

## OPPORTUNITIES

Microbiologists are employed in university, governmental and industrial research laboratories, diagnostic and quality control laboratories, teaching, and technical sales and service positions.

## CURRICULUM

The microbiology curriculum leads to a Bachelor of Science degree and is designed to provide the student with a strong foundation in mathematics, chemistry, and physics, and skills in oral and written communication. The student will also gain broad general knowledge of molecular and cellular biology as well as a foundation in the basic areas of microbiology and immunology. Graduates of this curriculum will be prepared for work in research laboratories and production facilities or for further study in graduate or professional schools.

# CURRICULUM IN MICROBIOLOGY
## Degree earned: B.S. in Microbiology

### FRESHMAN YEAR

(Applies to all students entering NC State Fall 1994 with fewer than 28 semester hours)

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 131 Analytic Geom. & Calculus A | 4 |
| Any 100-level PE in Fitness & Wellness[a] | 1 |
| Humanities/Soc. Sci. Elective[b] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 231 Analytic Geom. & Calculus B | 3 |
| Humanities/Soc. Sci. Elective | 3 |
| | 17 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 221 Organic Chemistry I | 4 |
| PY 211 General Physics I | 4 |
| ST 311 Intro. to Statistics | 3 |
| ZO 205 Intro. to Cellular & Developmental Zoology | 4 |
| Physical Education Elective[a] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| PY 212 General Physics II | 4 |
| ZO 305 Cellular & Animal Physiology Lab | 2 |
| MB 351 General Microbiology | 4 |
| Humanities/Soc. Sci. Elective | 3 |
| | 17 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BCH 451 Prin. of Biochemistry | 4 |
| BCH 452 Intro. Biochemistry Lab | 2 |
| MB 409 Microbial Diversity | 3 |
| Communication Elective[c] | 3 |
| Humanities/Soc. Sci. Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 333 Comm. for Sci. & Research | 3 |
| GN 411 Prin. of Genetics | 4 |
| GN 412 Elementary Genetics Lab | 1 |
| MB 411 Medical Microbiology | 4 |
| Humanities/Soc. Sci. Elective | 3 |
| Physical Education Elective[a] | 1 |
| | 16 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MB 414 Metabolic Regulation | 3 |
| MB 490 Senior Seminar in Micro. | 1 |
| Humanities/Soc. Sci. Elective | 3 |
| Microbiology Elective | 3 |
| Free Electives | 6 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| Humanities/Soc. Sci. Elective | 3 |
| Microbiology Elective | 6 |
| Free Electives | 6 |
| BO (ZO) 414 Cell Biology | 3 |
| Physical Education Elective[a] | 1 |
| | 15 |

Minimum Hours Required for Graduation ..... 128[d]

[a]Four semester hours of Physical Education (PE) credit are required for graduation; the first two hours of PE taken may be counted for free elective credit. If a student chooses not to count these first two hours as free elective credit, these hours will not count toward the minimum hours required for graduation and two additional hours of free elective credit must be completed prior to graduation.

[b]These courses must be selected from the approved GER listing for Humanities and Social Sciences as follows: **6 credits** in history and/or literature, **three credits** from philosophy, religion or visual and performing arts, **6 credits** from two different areas in psychology, economics, politics and government, sociology, anthropology or cultural geography, three credits of science technology and society from a humanities and social science perspective. The final three credits may be from any courses in the aforementioned categories. At least **one course** in the Humanities and Social Sciences must focus on a non-English speaking culture.
[c]Course must be selected from the approved GER Communication/Speech Electives List.
[d]Students must have demonstrated foreign language proficiency at the FL_102 level.

### MINOR IN MICROBIOLOGY

The Department of Microbiology offers an undergraduate minor available to all baccalaureate degree students at North Carolina State University who are not majoring in microbiology. The minor is especially appropriate for (but not limited to) students majoring in the biological or agricultural sciences, physical sciences or science education.

The minor requires 15 semester hours including 8 hours of required courses and 7 hours from a group of restricted electives. Any prerequisite courses are in addition to these courses. A grade of C or better is required for all courses taken to fulfill the minor requirements.

## CURRICULA IN NATURAL RESOURCES

(Also see Interdisciplinary Programs)

A.W. Oltmans, *Undergraduate Coordinator, Agricultural and Resource Economics* Nelson Hall, Room 233E

H. J. Kleiss, *Undergraduate Coordinator, Soil Science* , Williams Hall, Room 2321

Wise use of all our natural resources (soil, water, air, minerals, flora, fauna and people) for the benefit of current and future members of society is the goal of natural resource management. This important challenge recognizes the interdependence of people with their environment and requires an integrated, multi-disciplinary approach to solving society's resource problems. Population growth, rising incomes, lifestyle changes and urbanization lead to more intensive use of all natural resources. These trends present challenges to resource managers who must be trained in the basic principles of several disciplines in order to develop and apply sound management strategies to our resource problems. Natural resource professionals must understand resources and the social systems governing their use. They must be able to work in teams to analyze potential effects of resource use and to design ways to make

efficient use of natural and environmental resources for current and future generations.

To accommodate the breadth and complexity of natural resource management, the Bachelor of Science degree in natural resources is a campus-wide program involving three colleges and four departments that administer seven concentrations. A common core of 84 hours of coursework provides a balanced foundation in communication, humanities, social sciences, mathematics and the natural sciences. The core course requirements include a freshman orientation course and a senior-level applications course that natural resource majors in all concentrations must complete.

Within the College of Agriculture and Life Sciences, three concentrations are available: Economics and Management, Soil Resources and Soil and Water Systems. For information on other concentrations see Forestry and Marine, Earth and Atmospheric Sciences.

## CURRICULUM IN NATURAL RESOURCES, ECONOMICS AND MANAGEMENT CONCENTRATION
### Degree earned: B.S. in Natural Resources

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| CFR 134 Computers in Natural Resources | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 131 Analytic Geom. & Calculus A[1] | 4 |
| NR 100 Intro. to Natural Resources | 2 |
| Any 100-level PE in Fitness & Wellness[2] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 231 Analytic Geom. & Calculus B[1] | 3 |
| PS 201 Intro.to American Govt.*or* | |
| PS 202 State & Local Govt. | 3 |
| Physical Education Elective[2] | 1 |
| | 14 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 201 Intro.Agric. & Res. Economics *or* | |
| EC 201 Intro. to Economics I | 3 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| PY 211 College Physic I *or* | |
| PY 205 Physics for Engr. & Sci. I | 4 |
| Communication Elective[3] | 3 |
| Physical Education Elective[2] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE (EC) 336 Intro.Res. & Environ.Economics[4] | 3 |
| BO 200 Plant Life *or* | |
| ZO 201 General Zoology | 4 |
| MA 114 Intro.to Finite Math. Applic. | 3 |
| MEA 101 Geology I: Physical | 3 |
| MEA 110 Geology I Lab | 1 |
| Physical Education Elective[2] | 1 |
| | 15 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE (EC) 301 Intermediate Microeconomics | 3 |
| ARE 303 Farm Bus. Mgmt. *or* | |
| BUS (EC) 310 Managerial Economics | 3 |
| BO (ZO) 360 Intro. to Ecology[4] | 3 |
| BO (ZO) 365 Ecology Lab[4] | 1 |
| SSC 200 Soil Science | 4 |
| ST (BUS) 350 Economics & Bus. Statistics | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| ACC 220 Accounting II *or* | |
| ACC 280 Managerial Accounting | 3 |
| ENG 332 Comm. for Bus. & Mgmt. *or* | |
| ENG 333 Comm. for Sci. & Research | 3 |
| History *or* Literature Elective[5] | 3 |
| Phil., Relig., Vis/Perf. Arts Elective[5] | 3 |
| Restricted Elective[6] | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 306 Agricultural Law *or* | |
| ARE 309 Environ. Law & Economic Policy | 3 |
| ARE 321 Agric. Financial Mgmt. *or* | |
| BUS 320 Financial Mgmt. | 3 |
| ARE (EC) 436 Environ. Economics | 3 |
| History *or* Literature Elective[5] | 3 |
| Restricted Elective[6] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| BUS 455 Quant. Methods in Mgmt. *or* | |
| EC 451 Intro.to Econometrics | 3 |
| EC 410 Public Finance | 3 |
| NR 400 Natural Resource Mgmt. | 4 |
| Restricted Elective[6] | 3 |
| Social Science Elective[5,7] | 3 |
| | 16 |

Minimum Hours Required for Graduation ..... 120

**Note:** A minimum grade of C in ENG 111 and ENG 112, a grade point average of 2.000 in all ACC, ARE, BUS, EC and ECG courses attempted, and foreign language proficiency at the FL_ 102 level are required to be eligible for graduation.

[1]MA 141 and MA 241 may be taken in lieu of MA 131 and MA 231.
[2]Four credit hours of PE (including any 100-level PE in Fitness & Wellness) are required for graduation. First two PE courses do not count toward minimum hours required for graduation.
[3]Select from COM 110, COM 112, COM 146 or COM 211.
[4]Science, Technology, and Society courses: ARE(EC) 336 from Humanities/Social Sciences Perspective and BO 360/365 from Science/Technology Perspective.
[5]One of these courses must focus on a non-English speaking culture.
[6]Restricted Electives include: BAE(SSC) 323, BO 421, CS 411, FOR 252, FOR 401, FW(ZO) 353, FW(FOR) 404, FW(ZO) 420, MEA 130, MEA 135, MEA 140, MEA(ZO) 220, MEA 300, MEA 311, MEA 313, NR 300, SSC 361, SSC 370, SSC 461, ZO 441 or ZO 442.
[7]Select from Psychology, Politics & Government, Sociology, Anthropology, and Cultural Geography Electives lists.

# CURRICULUM IN NATURAL RESOURCES, SOIL RESOURCES CONCENTRATION

## Degree earned: B.S. in Natural Resources

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| CFR 134 Computers in Natural Resources | 1 |
| ENG 111 Comp. & Rhetoric[1] | 3 |
| MA 131 Analytic Geom. & Calculus A[2] | 4 |
| NR 100 Intro. to Natural Resources | 2 |
| Any 100-level PE in Fitness & Wellness[3] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. and Reading[1] | 3 |
| MA 231 Analytic Geom. & Calculus B[2] | 3 |
| PS 201 Intro. to American Govt. *or* | |
| PS 202 State & Local Govt. | 3 |
| Physical Education Elective[3] | 1 |
| History/Literature Elective[4] | 3 |
| | 17 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 201 Intro.to Agric. & Res. Economics *or* | |
| EC 201 Intro. to Economics I | 3 |
| BO 200 Plant Life | 4 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| MEA 101 Geology I: Physical | 3 |
| MEA 110 Geology I Lab | 1 |
| | 18 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 360 Intro. to Ecology | 3 |
| BO 365 Ecology Lab | 1 |
| PY 211 College Physics I | 4 |
| SSC 200 Soil Science | 4 |
| Comm./Speech Elective[5] | 3 |
| Physical Education Elective[3] | 1 |
| | 16 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE (EC) 336 Intro.to Res. & Environ. Economics | 3 |
| FOR 353 Air Photo Interp. & Photogram. | 3 |
| MB 351 General Microbiology *or* | |
| MEA 410 Intro. to Geological Materials | 4 |
| SSC 341 Soil Fertility & Fertilizers | 3 |
| SSC 342 Soil Fertility Lab | 1 |
| ST 311 Intro. to Statistics | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 220 Intro. Organic Chemistry | 4 |
| NR 300 Natural Resource Measurements | 4 |
| SSC 361 Role of Soils in Environ. Mgmt. | 3 |
| SSC 452 Soil Classification | 4 |
| Physical Education Elective[3] | 1 |
| | 16 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BAE (SSC) 323 Water Mgmt. | 3 |
| BAE (SSC) 324 Elementary Surveying | 1 |
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 333 Comm. for Sci. & Research. | 3 |
| Free Elective | 3 |
| SSC 461 Soil Physical Properties & Plant Growth | 3 |
| History/Literature Elective[4] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BAE 471 Land Resources Environ. Engr. *or* | |
| FOR 401 Watershed & Wetlands Hydrology *or* | |
| SSC 562 Environ. Applications of Soil Science | 3-4 |
| CS 200 Intro. to Turfgrass Mgmt. *or* | |
| CS 312 Pasture & Forage Crops | 3 |
| NR 400 Natural Resource Mgmt. | 4 |
| Phil. Relig. Vis/Perf. Arts Elective.[4] | 3 |
| Social Science Elective[6] | 3 |
| | 13-14 |

Minimum Hours Required for Graduation ..... 127

[1]Grade of C or better required for ENG 111 and ENG 112.
[2]MA 141 and MA 241 may be taken in lieu of MA 131 and MA 231.
[3]Four credit hours of PE required. The first two PE courses do not count toward minimum hours required for graduation.
[4]One of these courses must come from a list of courses that focus on a non-English speaking culture.
[5]Select from COM 110, COM 112, COM 146 or COM 211.
[6]Select from Psychology, Politics and Government, Sociology, Anthropology and Cultural Geography electives lists.

Note: Foreign Language proficiency at the FL_ 102 level is required for graduation

## CURRICULUM IN NATURAL RESOURCES, SOIL AND WATER SYSTEMS
## Degree earned: B.S. in Natural Resources

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| CFR 134 Computers in Natural Resources. | 1 |
| ENG 111 Comp. and Rhetoric[1] | 3 |
| MA 131 Analytic Geom. & Calculus A[2] | 4 |
| NR 100 Intro. to Natural Resources | 2 |
| Any 100-level PE in Fitness & Wellness [3] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. and Reading[1] | 3 |
| MA 231 Analytic Geom. & Calculus B[2] | 3 |
| PS 201 Intro. to American Govt. *or* | |
| PS 202 State and Local Govt. | 3 |
| History/Literature Elective[4] | 3 |
| Physical Education Elective[3] | 1 |
| | 17 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 201 Intro to Agric. & Res. Economics *or* | |
| EC 201 Intro. to Economics I | 3 |
| BO 200 Plant Life | 4 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| MEA 101 Geology I: Physical | 3 |
| MEA 110 Geology I Lab | 1 |
| Physical Education Elective[3] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 360 Intro. to Ecology | 3 |
| BO 365 Ecology Lab | 1 |
| PY 211 College Physics I | 4 |
| ST 311 Intro. to Statistics | 3 |
| Comm./Speech Elective[5] | 3 |
| Physical Education Elective[3] | 1 |
| | 15 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE (EC) 336 Intro.to Res. & Environ. Economics | 3 |
| BAE (SSC) 323 Water Mgmt. | 3 |
| BAE (SSC) 324 Elementary Surveying | 1 |
| MEA 200 Intro. to Oceanography | 3 |
| SSC 200 Soil Science | 4 |
| History/Literature Elective[4] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 333 Comm. for Sci. & Research | 3 |
| NR 300 Natural Resource Measurements | 4 |
| SSC 361 Role of Soils in Environ. Mgmt. | 3 |
| SSC 452 Soil Classification | 4 |
| ZO 419 Limnology | 3 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| FOR 401 Watershed & Wetlands Hydrology | 4 |
| MEA 493F Practical Hydrogeology *or* | |
| MEA 565 Hydrogeology | 3 |
| SSC 461 Soil Physical Properties & Plant Growth | 3 |
| Phil., Relig., Vis/Perf.Arts Elective.[4] | 3 |
| Restricted Elective[6] | 3-4 |
| | 16-17 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 309 Environ. Law Economic Policy *or* | |
| FOR 472 Renewable Res. Policy and Mgmt. | 3 |
| BAE 471 Land Resources Environ. Engr. *or* | |
| SSC 562 Environ. Applications of Soil Science | 3 |
| NR 400 Natural Resource Mgmt. | 4 |
| ZO 460 Aquatic Natural History Lab | 2 |
| Social Sciences Elective[7] | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 127

[1]Grade of C or better required for ENG 111 and ENG 112.
[2]MA 141 and MA 241 may be taken in lieu of MA 131 and MA 231.
[3]Four credit hours of PE required. The first two PE courses do not count toward minimum hours required for graduation.
[4]One of these courses must come from a list of courses that focus on a non-English speaking culture.
[5]Select from COM 110, COM 112, COM 146, or COM 211.
[6]Select from BAE 578, CH 220, FOR(MDS) 584 or MB 200.
[7]Select from Psychology, Politics and Government, Sociology, Anthropology and Cultural Geography electives lists.

**Note:** Foreign Language proficiency at the FL_ 102 level is required for graduation.

# DEPARTMENT OF PLANT PATHOLOGY

Gardner Hall, Room 2518

O. W. Barnett, *Head*

R. K. Jones, *Extension Specialist in Charge*

L. F. Grand, *Teaching Coordinator*

D. M. Benson, *Director of Graduate Programs*

## Teaching, Research and Extension Faculty

*Professors*: J. E. Bailey, K. R. Barker, O. W. Barnett Jr., D. F. Bateman, D. M. Benson, M. K. Beute, R. I. Bruck, C. L. Campbell, M. E. Daub, J. M. Davis, L. F. Grand, A. S. Heagle (USDA), J. -S. Huang, R. K. Jones, S. A. Lommel, L. T. Lucas, C. E. Main, J. W. Moyer, G. A. Payne, R. A. Reinert (USDA), D. F. Ritchie, H. D. Shew, P. B. Shoemaker, T. B. Sutton; *Emeriti*: J. L. Apple, C. W. Averre, III, R. Aycock, C. N. Clayton, C. B. Davey, H. E. Duncan, G. V. Gooding Jr., T. T. Hebert, A. Kelman, G. B. Lucas, R. D. Milholland, N. T. Powell, J. P. Ross, J. N. Sasser, H. W. Spurr Jr., D. L. Strider, H. H. Triantaphyllou, J. C. Wells, N. N. Winstead; *Associate Professors*: M. L. Carson (USDA), B. C. Haning, S. Leath (USDA), P. B. Lindgren, T. A. Melton, III, C. H. Opperman, J. B. Ristaino, S. R. Shafer (USDA), R. G. Upchurch (USDA);*Assistant Professors*: M. A. Cubeta, E. L. Davis, F. J. Louws; *Adjunct Assistant & Associate Professors*: D. Cookmeyer, G. M. Hellman, J. L. Imbriani, D. T. Kaplin, M. D. Law, S. Spencer, V. Subbiah; *Senior Researcher*: B. B. Shew; *Researchers*: S. R. Koenning, Z. Pesic-Van Esbroeck; *Research/Extension Specialist*: W. O. Cline; *Associate Members of the Faculty*: M. A. Conkling (Genetics), E. B. Cowling (Forestry), W. M. Hagler Jr. (Animal Science, Poultry Science), C. L. Hemenway (Biochemistry), R. C. Rufty (Crop Science), C. G. VanDyke (Botany); *Visiting Professors*: C. S. Hodges, D. P. Schmitt; *Visiting Assistant Professor*: D. M. Bird

Undergraduate instruction in plant pathology is designed to provide introductory and advanced courses on the nature and control of plant diseases to students majoring in crop science, horticultural science, agricultural education and forestry. It also provides fundamental training necessary for graduate study in plant pathology.

### OPPORTUNITIES

Employment in research, extension and teaching is available to graduates with advanced degrees in plant pathology. Research openings are with the U.S. Department of Agriculture, state experiment stations, industry and private consulting. The rapid development of agricultural chemicals, biotechnology and other methods for disease control offers numerous opportunities.

## DEPARTMENT OF POULTRY SCIENCE

Scott Hall, Room 203

G. B. Havenstein, *Head*

F. T. Jones, *Department Extension Leader*

S. L. Pardue, *Undergraduate Coordinator*

T. D. Siopes, *Director of Graduate Programs*

**TEACHING, RESEARCH, AND EXTENSION FACULTY**

*Alumni Distinguished Undergraduate Professor*: C. R. Parkhurst; *William Neal Reynolds Professor*: W. E. Donaldson; *Professors*: J. T. Brake, T. A. Carter, V. L. Christensen, W. J. Croom, F. W. Edens, J. D. Garlich, W. M. Hagler Jr., G. B. Havenstein, F. T. Jones, J. F. Ort, M. A. Qureshi, J. C. H. Shih, T. D. Siopes; M. J. Wineland; *Adjunct Professors*: M. R. Bakst, D. Balnave, W. L. Bryden, R. R. Dietert, K. K. Krueger, K. A. Schat; *Professors Emeriti*: W. G. Andrews, R. E. Cook, E. W. Glazener, P. B. Hamilton, J. R. Harris, C. H. Hill, G. A. Martin, W. C. Mills Jr., T. B. Morris; *Associate Professors*: K. E. Anderson, G. S. Davis, P. R. Ferket, S. L. Pardue, J. N. Petitte; *Adjunct Associate Professors*: W. E. Brown, C. A. Ricks, J. L. Tyczkowski; C. E. Whitfill; *Assistant Professors*: D. K. Carver, J. L. Grimes, C. M. Williams; *Adjunct Assistant Professor*: R. P. Gildersleeve; *Assistant Professor Emeritus*: J. R. West; *Extension Specialist Emeritus*: C. E. Brewer; *Associate Members of Faculty*: R. W. Bottcher (Biological and Agricultural Engineering), P. A. Curtis (Food Science), B. W. Sheldon (Food Science), D. P. Wages (College of Veterinary Medicine).

The Department of Poultry Science provides instruction in the principles of vertically integrated poultry production and in such related fields as nutrition, physiology, genetics, immunology, toxicology, biotechnology, and general poultry management. Through teaching, research, and extension, the department serves students, poultry producers, and allied industries. Poultry production has increased rapidly during the last two decades and ranks first in North Carolina as a source of agricultural income. North Carolina ranks third nationally in the production of

poultry products; the climatic and economic conditions in the state provide a sound base for continued expansion.

## OPPORTUNITIES

The change from small farm operations to large commercial poultry enterprises has created more specialized positions than there are available poultry graduates. Production-oriented positions and off-the-farm operations in activities such as processing and distribution offer new job opportunities. The allied industries -- feed, equipment, financing, pharmaceutical and other supplies -- need more employees trained in poultry science. Graduates hold positions as managers and field representatives for businesses identified with or serving the poultry industry. Graduates are also employed in communication and public relations and as teachers and extension and research specialists. Some graduates have their own poultry businesses.

## CURRICULA

Students desiring the Bachelor of Science with a major in poultry science may choose either the science or technology curriculum offered by the Department of Poultry Science. (See the *Graduate Catalog*). One may obtain a double major in certain other curricula through careful use of electives and/or summer school attendance. The student should consult the undergraduate advisers in the department(s) concerned. Currently, the pre-veterinary science student may utilize all requirements toward a Bachelor of Science degree in the science option. See the freshman year and basic requirements for College of Agriculture and Life Sciences.

The science curriculum is for the student interested in the basic biological and physical sciences. The student is better prepared for advanced study in various disciplines such as genetics, nutrition, physiology, and pathology. Several pre-veterinary students are currently enrolled in this curriculum and are seeking a Bachelor of Science degree in poultry science. (See Pre-Professional Program in Veterinary Medicine).

The technology curriculum in poultry science is designed to prepare students for direct entry into the poultry industry upon graduation; allows a greater selection of courses in business and economics; and offers a student both basic and applied knowledge in poultry production which can be used directly in a poultry operation upon graduation.

# SCIENCE CURRICULUM IN POULTRY SCIENCE
## Degree earned: B.S. in Poultry Science

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 107 PreCalculus Algebra & Trig. I | 3 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry Lab I | 1 |
| COM 110 Public Speaking | 3 |
| ENG 112 Comp. & Reading | 3 |
| MA 121 Elements of Calculus *or* | |
| MA 131 Analytic Geom. & Calculus A | 4 |
| Physical Education Elective[1] | 1 |
| | 15 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 201 Intro.to Agric. & Res. Economics | 3 |
| BAE 121 Computer Applic. in ALS *or* | |
| CSC 200 Intro.to Computers & Uses | 3 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| PO 201 Poultry Science & Prod. | 4 |
| PO 290 Poultry Seminar | 1 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 221 Organic Chemistry I | 4 |
| ST 311 Intro. to Statistics | 3 |
| Group A Elective[3] | 4 |
| Humanities/Soc. Sci. Electives[2] | 6 |
| Physical Education Elective | 1 |
| | 18 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| PO (ANS,FS) 322 Muscle Foods & Eggs | 3 |
| PO (ANS,NTR) 415 Comparative Nutrition[3] | 3 |
| PY 131 Conceptual Physics *or* | |
| PY 211 College Physics I | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 333 Comm. for Sci. & Research | 3 |
| GN 411 Prin. of Genetics | 4 |
| ACC/ARE/BUS/EC Elective[4] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Free Elective | 3 |
| | 16 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MB 351 General Microbiology | 4 |
| PO 405 Avian Physiology | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Free Elective | 4 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| PO 430 Poultry Breeding | 3 |
| VMF 401 Poultry Diseases | 4 |
| Group A Elective[3] | 3 |
| Free Electives | 6 |
| | 16 |

Minimum Hours Required for Graduation[5] ..... 128

[1]Four semester hours of Physical Education (PE) credit are required for graduation; the first two hours of PE taken may be counted for free elective credit. If a student chooses not to count these first two hours as free elective credit, these hours will not count toward the minimum hours required for graduation and two additional hours of free elective credit must be completed prior to graduation.

[2] a) At least one HSS course must focus on a non-English speaking culture. In addition, one course must be from the Science, Technology, and Society HSS Electives list.

b) Two courses from History Electives and Literature Electives list.
c) One course in the study of philosophy, religion, or the visual and performing arts.
d) Two courses from the HSS Electives list.
e) One course in the study of psychology, politics and government, sociology, anthropology, or cultural geography.

[3]One course from the Group A Electives listed in the CALS section of the *NC State Undergraduate Bulletin.*

[4]One course in the study of accounting, agricultural and resource economics, business management, or economics.

[5]Foreign language proficiency at the FL_102 level will be required for graduation.

## TECHNOLOGY CURRICULUM IN POULTRY SCIENCE
## Degree earned: B.S. in Poultry Science

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 107 Precalculus I | 3 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci Elective.[2] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry Lab I | 1 |
| COM 110 Public Speaking | 3 |
| ENG 112 Comp. & Reading | 3 |
| MA 121 Elements of Calculus *or* | |
| MA 131 Analytic Geom. & Calculus A | 4 |
| Physical Education Elective[1] | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE 201 Intro.to Agric. & Res. Economics | 3 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| PO 201 Poultry Science & Production | 4 |
| PO 290 Poultry Seminar | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BAE 121 Computer Applications in ALS *or* | |
| CSC 200 Intro.to Computers & Uses | 3 |
| CH 220 Intro. Organic Chemistry *or* | |
| CH 221 Organic Chemistry I | 4 |
| ARE/EC Elective[3] | 3 |
| Poultry Elective[4] | 2 |
| Free Elective | 3-4 |
| Physical Education Elective | 1 |
| | 16-17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| GN 301 Genetics in Human Affairs *or* | |
| GN 411 Prin. of Genetics | 3-4 |
| PO (ANS,FS) 322 Muscle Foods & Eggs | 3 |
| PO (ANS,NTR) 415 Comparative Nutrition | 3 |
| ACC/ARE/BUS/EC Elective[5] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 15-16 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 333 Comm. for Sci. & Research | 3 |
| PO 430 Poultry Breeding | 3 |
| Group A,B,C Electives[6] | 6 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Free Elective | 3 |
| | 18 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MB 351 General Microbiology | 4 |
| PO 405 Avian Physiology | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Poultry Elective[4] | 2 |
| Free Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| PO 425 Feed Mill Mgmt./Form. | 3 |
| VMF 401 Poultry Diseases | 4 |
| Group A Elective[7] | 4 |
| Poultry Elective[4] | 2 |
| Free Elective | 3 |
| | 16 |

Minimum Hours Required for Graduation[8] ..... 128

[1]Four semester hours of Physical Education (PE) credit are required for graduation; the first two hours of PE taken may be counted for free elective credit. If a student chooses not to count these first two hours as free elective credit, these hours will not count toward the minimum hours required for graduation and two additional hours of free elective credit must be completed prior to graduation.

[2] a) At least one HSS course must focus on a non-English speaking culture. In addition, one course must be from the Science, Technology, and Society HSS Electives list.

b) Two courses from History Electives and Literature Electives list.

c) One course in the study of philosophy, religion, or the visual and performing arts.

d) One course in the study of psychology, politics and government, sociology, anthropology, or cultural geography.

[3]One course from the following: ARE 210, ARE(EC) 301, ARE 311, ARE(EC) 336, ARE 433, ARE 436, EC 202, EC 302, or EC 372.

[4]Select 3 courses from the following: PO 301, PO 420, PO 422, or PO 423.

[5]One course in the study of agricultural and resource economics, business management, accounting, or economics.

[6]Courses from the A, B, C, Electives listed in the *NC State Undergraduate Bulletin.*

[7]One course from the Group A Electives listed in the *NC State Undergraduate Bulletin.*

[8]Foreign language proficiency at the FL_102 level is required for graduation.

## PRE-MEDICAL SCIENCES

Pre-dental, pre-medical and pre-optometry are offered as a combined concentration designated SDM within the College of Agriculture and Life Sciences (CALS). Students desiring these careers in the medical sciences should be aware that an intense competition exists for admission to professional schools and that an early alternative career strategy is essential. So that pre-professional students are strategically positioned for success, CALS students will be expected to adopt a primary departmental major as their approach to applying to professional schools, and to be competitive by maintaining minimal academic standards. Thus, students must achieve a 2.800 GPA for the first 30 hours attained (freshman year) in order to remain in the SDM concentration or to enter SDM as a transfer freshman; however, those who fail to achieve the 2.800 GPA will be permitted to "buy-back-in" using the following rising GPA scale established for inter- and intra- campus transfer students:FR = 2.800; SO = 2.900; JR = 3.000; SR = 3.100.

All students admitted to the SDM non-degree concentration must be committed to a primary departmental major before completing three semesters (45-50 hrs.) of work. Otherwise, uncommitted students in the College of Agriculture and Life Sciences will

not be allowed to register for subsequent semesters until a departmental major is declared.

In addition to taking the minimum required courses indicated below for admission to most medical, dental and optometry schools, students should take courses that improve and develop oral communication skills as well as critical thinking, writing and reading comprehension skills. Further, students should seek opportunities to conduct research on or off campus and to obtain hands-on experience by volunteering to work in hospitals, clinics, nursing homes or in dental and optometry offices. These courses and special experiences, in addition to achieving a high GPA and competitive scores on special admissions exams, are now considered minimal requirements for admission to most professional schools.

***The courses listed below are considered minimum requirements for students applying to medical, dental and optometry schools and for those who wish to earn the SDM option:***

| *English Composition* | *Credits* |
|---|---|
| ENG 111 Composition and Rhetoric | 3 |
| ENG 112 Composition and Reading | 3 |
| ***Humanities/Social Sciences*** | |
| (as specified in the General Education Requirements | 12 |
| #Optometry schools require one or two courses in psychology | |
| ***Physical Sciences*** | |
| *BCH 451 Principles of Biochemistry | 4 |
| CH 101 Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| CH 221 Organic Chemistry I | 4 |
| CH 223 Organic Chemistry II | 4 |
| MA 121 Elements of Calculus ***or*** | |
| MA 131 Analytic Geometry and Calculus A | 4 |

***Some medical schools may require two or more calculus courses; if so, consider:***

| | |
|---|---|
| MA 131 Analytic Geometry and Calculus A and | 4 |
| MA 231 Analytic Geometry and Calculus B | 4 |
| OR | |
| MA 141 Analytical Geometry and Calculus I and | 4 |
| MA 241 Analytical Geometry and Calculus II and | 4 |
| MA 242 Analytical Geometry and Calculus III | 4 |
| #ST 311 Intro. to Statistics | 3 |
| PY 211 College Physics I ***and*** | 4 |
| PY 212 College Physics II | 4 |
| ***OR*** | |
| PY 205 Physics for Engineers and Scientists I ***and*** | 4 |

PY 208 Physics for Engineers and Scientist II ..... 4

*Biological Sciences*
BIO 125 General Biology ..... 4
*#MB 351 General Microbiology ..... 4
**ZO 303 Vertebrate Zoology ..... 3
**ZO 304 Vertebrate Zoology Lab ..... 1

* *Recommended*
** *Recommended, or select a different zoological or biological science course with its laboratory (but not a botanical course).*
\# *Required by optometry schools*

## PRE-PROFESSIONAL PROGRAM IN VETERINARY MEDICINE

Students with interests in veterinary medicine who enroll in the undergraduate programs at North Carolina State University should pursue a baccalaureate degree in a major area that fulfills the requirements of the pre-professional program. Pre-professional courses are designed to give students a background in animal health, poultry health and laboratory animal care. At the present time a preveterinary curriculum is offered in the College of Agriculture and Life Sciences. A student may major in animal science, poultry science, biochemistry, zoology, biological sciences, or biological sciences options, as well as in other science curricula. The choice of the degree program should be carefully considered to encompass alternate career objectives. If students are accepted to veterinary college before completion of their undergraduate degrees, some course credits may be transferred from the veterinary program toward completion of the Bachelor of Science degree. Arrangements for this procedure should be made with the degree-granting college or department prior to entering veterinary college.

The courses listed below are minimum requirements for all students applying for entrance to the College of Veterinary Medicine at NC State University. A grade of C or better on each course and an overall grade point average of 2.750 or above is required for application.

| *English Composition* | *Credits* |
|---|---|
| ENG 111 Composition and Rhetoric | 3 |
| ENG 112 Composition and Read | 3 |
| *Humanities/Social Sciences* | 12 |
| (At least six hours in each area must be completed.) | |

*Physical Sciences*
BCH 451 Principles of Biochemistry ..... 4
CH 101 General Chemistry I ..... 3
CH 121 General Chemistry I Lab ..... 1
CH 107 General Chemistry II ..... 3

CH 127 General Chemistry II Lab ..... 1
CH 221 Organic Chemistry I ..... 4
CH 223 Organic Chemistry II ..... 4
MA 121 Elements of Calculus *or*
MA 131 Analytic Geometry and Calculus A ..... 4
PY 211 College Physics I ..... 4
PY 212 College Physics II ..... 4
ST 311 Intro. to Statistics ..... 3

*Biological Sciences*
BIO 125 General Biology ..... 4
GN 411 Principles of Genetics ..... 4
MB 351 General Microbiology ..... 4

*Nutrition*
At least one course in animal nutrition is required.
ANS 230 Nutrition and Growth of Domestic Animals *or*
ANS 250 Applied Animal Nutrition *or*
ANS (FS, NTR) 301 Intro. to Human Nutrition *or*
ANS (NTR, PO) 415 Comparative Nutrition ..... 3

*Faculty advisers have a list of suggested courses for pre-professional students.*

# DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY

(See Humanities and Social Sciences)
1911 Building, Room 301

W. B. Clifford, *Head*

M. T. Zingraff, *Associate Head*

A. C. Davis, *Undergraduate Coordinator (Applied Sociology)*

R. S. Ellovich, *Undergraduate Administrator*

M. D. Schulman, *Director of Graduate Programs*

S. K. Garber, *Department Extension Leader*

### Teaching, Research and Extension Faculty

*Professors:* W. B. Clifford, L. R. Della Fave, V. A. Hiday, R. L. Moxley, L. B. Otto, M. M. Sawhney, M. D. Schulman, D. T. Tomaskovic-Devey, R. C. Wimberley, E. M. Woodrum, M. T. Zingraff; *Professors Emeriti*: J. N. Collins, E. M. Crawford, V. E. Hamilton, T. N. Hobgood Jr., C. P. Marsh, O. Uzzell, M. E. Voland, J. N. Young; *Associate Professors*: M. P. Atkinson, R. F. Czaja, A. C. Davis, S. K. Garber, G. D. Hill, T. J. Hoban, J. C. Leiter, S. C. Lilley, B. J. Risman, I. Rovner, M. L. Schwalbe, M. S. Thompson, R. J. Thomson, K. M. Troost, M. L. Walek, J. M. Wallace; *Associate Professors Emeriti*: R. C. Brisson, G. S. Nickerson, J. C. Peck, P. P. Thompson; *Assistant Professors*: R. S. Ellovich, T. N. Greenstein, P. L. McCall, A. L. Schiller, W. R. Smith, C. R. Zimmer; *Assistant Professors Emeriti*: C. G. Dawson, T. M. Hyman; *Associate Member of the Faculty*: R. D. Mustian (Department of Agricultural and Extension Education)

This Department teaches students the principles and techniques for understanding human group behavior. More specifically the department seeks to educate students in understanding communities and organizations and the people who live and work within them, to qualify exceptional students at the undergraduate and graduate level for sociological research, teaching, and extension careers and to solve problems in human group relations. Applied sociology is good training for a wide variety of careers. It is useful for any job which involves work with people, organizations or communities. It is also good preparation for professional organizations or communities and for professional careers in local government, personnel relations, law, the clergy, business and management.

## CURRICULA

The degree of Bachelor of Science with a major in applied sociology is offered under the science curriculum of the College of Agriculture and Life Sciences. In addition to topics in agricultural and community sociology, majors in this department have the option of concentrating in criminal justice.

## CURRICULUM IN APPLIED SOCIOLOGY
## Degree earned: B.S. in Applied Sociology

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 105 Biology in Modern World *or* | |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 107 Precalculus I | 3 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| SOC 202 Prin. of Sociology | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 100 Chemistry & Society *or* | |
| CH 101 General Chemistry I *and* | |
| CH 121 General Chemistry I Lab | 4 |
| ENG 112 Comp. and Reading | 3 |
| MA 131 Analytic Geom. & Calculus A | 4 |
| SOC 241 Soc. of Agric. & Rural Society | 3 |
| Free Elective | 3 |
| Physical Education Elective[1] | 1 |
| | 18 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CSC 200 Intro.to Computers *or* | |
| Computer Science Elective | 3 |
| GN 301 Genetics in Human Affairs | 3 |
| SOC 301 Human Behavior | 3 |
| ST 311 Intro. to Statistics | 3 |
| English, Comm. *or* Foreign Lang. Elective[3] | 3 |
| Physical Education Elective[1] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ANT 252 Cultural Anthropology | 3 |
| ARE 201 Intro.to Agric. & Res. Economics *or* | |
| EC 201 Intro. to Economics I | 3 |
| PS 201 Intro.to American Govt. *or* | |
| PS 202 State & Local Govt. | 3 |
| PY 131 Conceptual Physics | 4 |
| Literature Elective[4] | 3 |
| Physical Education Elective[1] | 1 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| SOC 300 Social Research Methods | 4 |
| SOC 311 Community Relationships | 3 |
| History Elective[5] | 3 |
| Restricted SOC Elective (300+)[6] | 3 |
| Free Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ANT 251 Physical Anthropology | 3 |
| SOC 400 Theories of Social Structure *or* | |
| SOC 401 Theories of Social Interaction | 3 |
| Mathematical or Natural Science Elective[7] | 3 |
| Phil, Relig., Vis/Perf. Arts[8] | 3 |
| Free Elective | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| SOC 351 Population and Planning | 3 |
| SOC 410 Soc. of Organization | 3 |
| Humanities/Soc.Sci. Electives[2] | 6 |
| Free Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| SOC 485 Indep. Field Work in Appl. Soc. | 3 |
| Elective (A,B,C, or Hum. & Social Sci.)[9] | 7 |
| Restricted SOC Elective (400+)[10] | 3 |
| Sci., Technology & Soc. Elective[11] | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 128

*Note:* Foreign Language proficiency at the FL_102 level is required to be eligible for graduation.

[1]Four semester hours of Physical Education (PE) credit are required for graduation; the first two hours of PE taken may be counted for free elective credit. If a student chooses not to count these first two hours as free elective credit, these hours will not count toward the minimum hours required for graduation and two additional hours of free elective credit must be completed prior to graduation.
[2]This course must be selected from the Humanities and Social Sciences List of the NC State General Education Lists of Electives.
[3]This course must be selected from either the English List, the Communication List or the Foreign Language List included in the NC State General Education Lists of Electives.
[4]This course must be selected from the Humanities Literature List of the NC State General Education Lists of Electives.
[5]This course must be selected from the History List of the NC State General Education Lists of Electives.
[6]Any 300 level Sociology course other than a required course will fulfill this requirement.
[7]This elective course must be selected from either the Mathematical Sciences List or either of the Natural Sciences List included in the NC State General Education Lists of Electives.
[8]This elective course must be selected from either the Philosophy List, the Religion List or the Visual and Performing Arts List of the NC State General Education Lists of Electives.
[9]This course may be chosen from the CALS category A, B, C, list shown in the Catalog or the Humanities and Social Sciences List in the NC State General Education Lists of Electives.
[10]Any 400 level Sociology course other than a required course will fulfill this requirement.
[11]This elective course must be selected from one of the Perspectives Lists within the Science Technology and Society Lists of the NC State General Education Lists of Electives.

# CURRICULUM IN APPLIED SOCIOLOGY, CRIMINAL JUSTICE CONCENTRATION
## Degree earned: B.S. in Applied Sociology

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 105 Biology in Modern World *or* | |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 107 Precalculus I | 3 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| SOC 202 Prin. of Sociology | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 100 Chemistry and Society *or* | |
| CH 101 General Chemistry I *and* | |
| CH 121 General Chemistry I Lab | 4 |
| ENG 112 Comp. and Reading | 3 |
| MA 131 Analytic Geom. & Calculus A | 4 |
| PS 201 Intro.to American Govt. | 3 |
| SOC 241 Soc. of Agric. & Rural Society | 3 |
| Physical Education Elective[1] | 1 |
| | 18 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CSC 200 Intro. to Computers *or* | |
| Computer Science Elective | 3 |
| GN 301 Genetics in Human Affairs | 3 |
| SOC 306 Criminology | 3 |
| ST 311 Intro. to Statistics | 3 |
| English, Comm., *or* Foreign Lang. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ANT 252 Cultural Anthropology | 3 |
| ARE 201 Intro.to Agric. & Res. Economics *or* | |
| EC 201 Intro. to Economics I | 3 |
| PS 311 Criminal Justice Policy Process | 3 |
| PY 131 Conceptual Physics | 4 |
| Literature Elective[3] | 3 |
| Physical Education Elective[1] | 1 |
| | 17 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ANT 251 Physical Anthropology | 3 |
| SOC 300 Social Research Methods | 4 |
| SOC 301 Human Behavior | 3 |
| History Elective[4] | 3 |
| Philo., Relig., Vis/Perf. Arts Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| SOC 400 Theories of Social Structure *or* | |
| SOC 401 Theories of Social Interaction | 3 |
| Criminal Justice (SOC) Elective[6] | 3 |
| Mathematical *or* Natural Science Elective[7] | 3 |
| Restricted Sociology Elective (300+)[8] | 3 |
| Free Elective | 3 |
| | 15 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| SOC 351 Population and Planning | 3 |
| Criminal Justice (PS) Elective[9] | 3 |
| Criminal Justice (SOC) Elective[6] | 3 |
| Humanities/Soc.Sci. Elective[10] | 3 |
| Free Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| SOC 413 Criminal Justice Fieldwork | 4 |
| Criminal Justice (SOC) Elective[6] | 3 |
| Humanities/Soc. Sci.Elective[10] | 3 |
| Restricted Sociology Elective (400+)[11] | 3 |
| Sci., Technology & Soc. Elective[12] | 3 |
| | 16 |

Minimum Hours Required for Graduation ..... 128

Note: Foreign Language proficiency at the FL_102 level is required to be eligible for graduation.

[1]Four semester hours of Physical Education (PE) credit are required for graduation; the first two hours of PE taken may be counted for free elective credit. If a student chooses not to count these first two hours as free elective credit, these hours will not count toward the minimum hours required for graduation and two additional hours of free elective credit must be completed prior to graduation.
[2]This course must be selected from either the English List, the Communication List or the Foreign Language List included in the NC State General Education Lists of Electives.
[3]This course must be selected from the Literature List of the NC State General Education Lists of Electives.
[4]This course must be selected from the History List of the NC State General Education Lists of Electives.
[5]This course must be selected from either the Philosophy List, the Religion List or the Visual and Performing Arts List of the NC State General Education Lists of Electives.
[6]This course must be selected from the Sociology-Criminal Justice Course List which includes SOC 420, SOC 425, SOC 426, SOC 427, SOC 515, SOC 516.
[7]This course must be selected from either the Mathematical Sciences List or either of the Natural Sciences Lists included in the NC State General Education Lists of Electives.
[8]Any 300 level Sociology course other than a required course will fulfill this requirement.
[9]This course must be selected from the Political Science-Criminal Justice Course List which includes PS 306, PS 307, PS 415, PS 445, PS 506, PS 517.
[10]This course must be selected from the Humanities and Social Sciences List of the NC State General Education Lists of Electives.
[11]Any 400 level Sociology course other than a required course will fulfill this requirement.
[12]This elective course must be selected form one of the Perspectives Lists within the Science Technology and Society Lists of the NC State General Education Lists of Electives.

# DEPARTMENT OF SOIL SCIENCE

Williams Hall, Room 2234

J. L. Havlin, *Head*

C. D. Raper Jr., *Director of Graduate Programs*

S. C. Hodges, *Department Extension Leader*

**TEACHING, RESEARCH, AND EXTENSION FACULTY**

*Alumni Distinguished Graduate Professor: S.* W. Buol; *William Neal Reynolds Professors:* S. W. Buol, J. W. Gilliam, E. J. Kamprath; *Professors:* A. Amoozegar, S. W. Broome, D. K. Cassel, F. R. Cox, T. L. Grove, M. T. Hoover, D. W. Israel (USDA), L. D. King, H. J. Kleiss, G. S. Miner, C. D. Raper Jr., M. J. Vepraskas, R. J. Volk, A. G. Wollum, J. P. Zublena; *Adjunct Professors:* P. G. Hunt, R. J. McCracken; *Professors Emeriti:* J. V. Baird, W. V. Bartholomew, M. G. Cook, G. A. Cummings, R. W. Cummings, J. W. Fitts, W. A. Jackson, E. J. Kamprath, C. B. McCants, J. A. Phillips, P. A. Sanchez, S. B. Weed; *Associate Professors:* S. C. Hodges, G. D. Hoyt, R. A. McLaughlin, G. C. Naderman, T. J. Smyth, M. G. Wagger, *Adjunct Associate Professor:* M. R. Tucker, *Associate Professors Emeriti:* J. P. Lilly, R. E. McCollum, J. E. Shelton, *Assistant Professors:* D. A. Crouse, C. R. Crozier, D. L. Hesterberg, D. L. Lindbo, R. L. Mikkelsen, *Adjunct Assistant Professors:* C. A. Ditzler, B. D. Hudson, B. F. McQuaid, *Assistant Professor Emeritus:* C. K. Martin; *Senior Researcher:* W. P. Robarge, *Associate Members of the Faculty:* H. L. Allen, L. T. Henry, R. Lea (Forestry); S. R. Shafer (Plant Pathology); R. W. Skaggs (Biological and Agricultural Engineering); G.F. Peedin, J.B. Weber (Crop Science).

The Department of Soil Science trains students in fundamentals of soils, develops an understanding and appreciation of soils as a resource, and presents principles of soil management and utilization for both farm and non-agricultural purposes. Soils constitute one of the largest capital investments in farming, and proper soil management is essential for efficient production. Future world food needs will

require people conversant in soil resources and use of fertilizers. Soil properties are important consideration in urban-suburban planning and development. Also, knowledge of soil and its interaction with potential pollutants is essential in maintaining environmental quality. Therefore, the demand for people trained in soils by private consultants, agribusiness, research, service planning-development, education and conservation-related agencies should continue to be great.

## OPPORTUNITIES

Soil science graduates fill positions of leadership and service in land resource planning, conservation, natural resource management and agriculture. Among these are opportunities as farm operators and managers, county agricultural extension agents and employees of other public advisory agencies, Natural Resources Conservation Service and other conservation-related agencies concerned with soil resources. Graduates also serve as technical representatives and salesmen in fertilizer companies and in other agribusiness activities. Many opportunities exist for private consulting soil scientists who serve a variety of clientele needs. Environmental concerns usually require soil science expertise, especially in land-based waste management. Provision is made for students wishing a more thorough training in biological sciences, chemistry, mathematics and physics leading to graduate study. (See the *Graduate Catalog* for a listing of graduate degrees.) Students with an advanced degree have wide opportunities in teaching, research, service and extension with state, federal and private educational and research institutions and agencies.

## CURRICULA

The Bachelor of Science degree may be obtained with major in agronomy, natural resources or environmental sciences. The agronomy program is administered jointly with the Crop Science Department. A soil science concentration is available in the agronomy curriculum. Two soils concentrations are available in the natural resources curriculum, soil resources and soil and water resource systems. An environmental soil science concentration is available in the environmental sciences curriculum. (The agronomy, natural resources and environmental sciences curricula are shown earlier under College of Agriculture and Life Sciences.)

## MINOR IN SOIL SCIENCE

The academic minor in soil science is offered to students desiring a strong knowledge of the principles of soil science to complement their major. It is intended to strengthen the understanding of basic physical and chemical soil properties that would be relevant to a student's particular land management interest. These interests may include but are not limited to conservation, forestry, geology, landscape architecture, horticulture, biological and agricultural engineering, agricultural business management, or agricultural education. Fourteen hours of required courses and three hours of electives are necessary to complete the minor.

# DEPARTMENT OF TOXICOLOGY

Method Unit IV

E. Hodgson, *Head*

R. B. Leidy, *Director of Graduate Programs*

**Teaching, Research and Extension Faculty**

*William Neal Reynolds Professor:* E. Hodgson; *Professor:* W. C. Dauterman; *Adjunct Professors:* J. A. Bond, J. R. Fouts, J. A. Goldstein, R. J. Langenbach, R. O. McClellan, R. M. Philpot, R. J. Preston; *Professor Emeritus:* T. J. Sheets; *Associate Professors:* R. B. Leidy, R. C. Smart; *Research Associate Professor:* P. E. Levi; *Adjunct Associate Professors:* A. E. Chalmers, N. Chernoff, K. M. Crofton, T. E. Eling, H. B. Matthews, L. Recio; *Assistant Professors:* M. B. Genter, G. A. LeBlanc, D. Shea; *Research Assistant Professor:* S. A. Meyer; *Associate Members of the Faculty:* K. B. Adler (Veterinary Medicine), A. L. Aronson (Veterinary Medicine), C. Brownie (Statistics), C. F. Brownie (Veterinary Medicine), J. M. Cullen (Veterinary Medicine), W. E. Donaldson (Poultry Science), W. J. Fleming (Forestry, Zoology), H. M. Hassan (Biochemistry, Food Science, Microbiology), W. W. Heck (Botany), R. J. Kuhr (Entomology), R. J. Linderman (Chemistry), W. H. McKenzie (Genetics), N. A. Monteiro-Riviere (Veterinary Medicine), D. E. Moreland (Botany, Crop Science, Forestry), M. A. Qureshi (Microbiology, Poultry Science), J. E. Riviere (Veterinary Medicine), C. L. Robinette (Veterinary Medicine), R. M. Roe (Entomology).

The Department of Toxicology offers courses of study leading to the Master of Toxicology, Master of Science and Doctor of Philosophy degrees. The Department of Toxicology trains qualified individuals to conduct basic and applied scientific research on the mechanisms of chemically induced toxicity, to advance toxicology as a science and to communicate concepts of toxicology.

# DEPARTMENT OF ZOOLOGY

Gardner Hall, Room 1627, South Wing

T.L. Grove, *Interim Head*

P.C. Bradbury, *Undergraduate Coordinator*

J.F. Gilliam, *Director of Graduate Programs*

**Teaching, Research and Extension Faculty**

*Alumni Distinguished Undergraduate Professors:* G. T. Barthalmus, J. F. Roberts; *Professors:* B. L. Black, P. C. Bradbury, P. T. Bromley, B. J. Copeland, P. D. Doerr, J. F. Gilliam, W. C. Grant, H. F. Heatwole, C. F. Lytle, J. M. Miller, R. L. Noble, H. A. Underwood, J. G. Vandenbergh; *Adjunct Professors:* F. A. Cross, L. B. Crowder, D. E. Hoss, G. R. Huntsman, G. W. Thayer, J. R. Walters; *Professors Emeriti:* W. W. Hassler, M. T. Huish, G. C. Miller, T. L. Quay, D. E. Smith; *Associate Professors:* R. R. H. Anholt, R. M. Grossfeld, J. F. Hinshaw, R. G. Hodson, T. M. Losordo, S. C. Mozley, M. Niedzlek-Feaver, R. A. Powell, J. A. Rice, C. V. Sullivan; *Adjunct Associate Professors:* W. J. Fleming (USBS), C. S. Manooch, III, R. M. Shelley, H. W. van der Veer; *Research Associate Professor:* B. A. Weeks-Perkins; *Assistant Professors:* R. J. Borski, J. A. Collazo (USBS), T. R. Simons (USBS); *Adjunct Assistant Professors:* L. Alterman, E. M. Bennett, S. V. Chiavetta, R. J. Kavlock, R. W. Laney (USBS); *Adjunct Instructors:* A. L. Braswell, R. B. Hamilton; *Associate Members of the Faculty:* E. J. Jones (Extension Forest Resources), R. A. Lancia (Forest Resources), K. H. Pollock (Statistics), R. G. Wolcott (Engineering and Marine, Earth and Atmospheric Sciences).

***Affiliated Faculty, Medical Technology Programs***

Bowman Gray School of dMedicine/N.C. Baptist Hospital
Marbry Hopkins, M.D. Medical Director
Lenora Flynn, MT(ASCP),A.B.,M.Ed., Program Director

Carolinas Medical Center
Edward H. Lipford, III, M.D., Medical Director
Elizabeth T. Anderson, MHDL, MT(ASCP),CLS(NCA), Program Director

Moses Cone Memorial Hospital
Mary Steuterman, M.D., Medical Directors
Theresa O'Laughlin, MCLT, MT(ASCP), SH, Program Director

The Department of Zoology provides undergraduate and graduate instruction in specialized biological sciences areas. Undergraduates study all levels of biological organization from the molecular to the community. Zoology majors are well prepared for graduate work in zoology and related fields of sciences. (See the *Graduate Catalog* for a listing of graduate degrees.) Participation in supervised programs of research is strongly encouraged. A strong science background is provided for students planning to enter dentistry, medicine, optometry, veterinary medicine and allied health sciences, such as medical technology. Ecology, including wildlife, fisheries, behavioral ecology and marine biology, is a strong area. Cellular and molecular biology, including reproductive endocrinology and neurobiology, also are emphasized.

## OPPORTUNITIES

Bachelor of Science graduates in zoology have many career options. Graduates are well prepared for employment in various government agencies or private industries. Graduates may continue their education with studies leading to advanced degrees in many areas of biological sciences such as zoology, cell biology, wildlife and fisheries science, marine science and biomedical subdisciplines. Many also choose to seek degrees in medicine, dentistry, veterinary medicine and other health-related areas.

## CURRICULA

The Bachelor of Science degree with a major in zoology, fisheries and wildlife sciences or medical technology is offered under the science curriculum of the College of Agriculture and Life Sciences. Within these majors a student may specialize depending upon interest and ability.

The zoology curriculum (SZO) prepares students for graduate school, medical, dental or optometry school (SZO/SDM), and for veterinary schools (SZO/SPV). Certain professional schools have specific requirements which differ slightly from the zoology curriculum. Students should consult catalogs of specific professional schools to ensure completion of any special requirements.

Other curricula include the fisheries (SFF) and wildlife (SFW) sciences program and the medical technology program (SZM). The clinical year for the medical technology program is by competitive selection at an affiliated hospital. Students are advised by faculty in their special areas of interest.

## CURRICULUM IN ZOOLOGY(SZO)
## Degree earned: B.S. in Zoology

**Note:** This is a suggested order of courses. As long as prerequisites are observed, and specific semester restrictions are observed (see footnotes), courses may be taken in other semesters.

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ALS 103 Intro. Topics in ALS | 1 | CH 101 General Chemistry I | 3 |
| BIO 125 General Biology | 4 | CH 121 General Chemistry I Lab | 1 |
| ENG 111 Comp. & Rhetoric | 3 | ENG 112 Comp. & Reading | 3 |
| MA 107 Precalculus I | 3 | MA 121 Elements of Calculus *or* | |
| Any 100-level PE in Fitness & Wellness[1] | 1 | MA 131 Analytic Geom. & Calculus A[3] | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 | ZO 208 Intro.Organ./Evol. Zool.[4] | 4 |
| | 15 | Physical Education Elective[1] | 1 |
| | | | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ZO 205 Intro.Cell/Dev. Zool.[4] | 4 |
| Humanities/Soc. Sci. Electives[2] | 6 |
| Physical Education Elective[1] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| BAE 121 Computer Applications in ALS *or* | |
| CSC 200 Intro.to Computer & Uses | 3 |
| CH 221 Organic Chemistry I | 4 |
| Humanities/Soc. Sci. Elective[2] | 6 |
| Zoology Elective[5] | 3 |
| Physical Education Elective[1] | 1 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| GN 411 Prin. of Genetics | 4 |
| PY 211 College Physics I | 4 |
| ZO 305 Cellular & Animal Physiology Lab[6] | 2 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| COM 110 Public Speaking *or* | |
| COM 112 Interpersonal Comm. *or* | |
| COM 146 Bus. & Professional Comm. *or* | |
| COM 211 Argument & Advocacy | 3 |
| PY 212 College Physics II | 4 |
| Zoology Elective[5] | 6 |
| Zoology Lab Course Elective[7] | 3 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Advanced Writing Elective[8] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Restricted Elective[9] | 4 |
| Zoology Elective[5] | 3 |
| Free Elective[10] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| Restricted Electives[9] | 6 |
| Zoology Elective[5] | 3 |
| Free Electives[10] | 6 |
| | 15 |

Minimum Hours Required for Graduation ..... 127[11]

[1]Four semesters of physical education (PE) credit are required for graduation; the first two hours of PE taken may be counted for Free Elective credit. If the student chooses not to count these first two hours as Free Elective credit, these hours will not count toward graduation and two additional hours of Free Elective credit must be completed prior to graduation.

[2]Among 21 credits of Humanities & Soc. Sci. (HSS), the student must take one history; one literature; one course in philosophy, religion or visual/performing arts (develops aesthetics, creativity and judgment); two courses from psychology, politics, economics (recommended), government, sociology, anthropology or cultural geography; two additional courses from any approved HSS lists. One of the above must come from the approved Gen. Ed. Requirements list of Courses on Non-English Speaking Cultures and one from the Science, Technology & Society (Humanities Perspective) list of courses.

[3]If you wish to elect MA 231 later as an elective, take MA 131 and not MA 121.

[4]ZO 205 and ZO 208 (grade "C" minimum) are required; either course may be taken first.

[5]Choose from 4 different Zoology course groupings (levels); at least one course per level; total must be at least 15 credits. Should the student become interested in medicine, or is currently in the Premed/Predent (SDM) curriculum, note that some medical/dental schools require vertebrate zoology (ZO 303/304) or anatomy (ZO 370/375 and 371/376).

*Organismal Level*
- ZO 303 (3)
- ZO 315 (3)
- ZO 402 (2)
- ZO 441 (3)

*System Level*
- ZO 361 (3)
- ZO 370 (3)
- ZO 371 (3)
- ZO 421 (3)

*Cellular & Molecular Level*
- BCH 451 (4)

*Supraorganismal Level*
- BO/ZO 360 (3)

BO/ZO 414 (3)
ZO 370 (3)
ZO 371 (3)
ZO 410 (3)
ZO 450 (3)

[6]One of the written lab reports must include a detailed library search and will be a major paper. ZO 305 must be taken in the Junior year; if not, another course with a designated major paper requirement must be taken in the Junior year.
[7]Choose a lab course or courses from the approved Zoology list (3 credit hours):

*Zoology Lab Courses*

BCH 452 (2)
GN 412 (1)
ZO 304 (1)-ZO 303 (3) is a corequisite
ZO 365 (1)-ZO 360 (3) is a corequisite
ZO 375 (2)
ZO 376 (2)
ZO 403 (2)
ZO 442 (1)
ZO 460 (2)
ZO 480 (3)

[8]The student must take an advanced writing course (ENG 331, 332, 333) in which the Senior year paper will be written.
[9]Choose from courses listed in the Undergraduate Catalog, College Agri. & Life Sciences Group A (Physical and Biological Science). Recommended are: any Zoology or Fisheries & Wildlife courses (except ZO 201), BO 200, BCH 451, MB 351, MB 411. Select these on the basis of your interests and career goals. Preveterinary second majors (SPV) must take ST 311, MB 351, BCH 451 and one course in nutrition (ANS 250 or ANS 415 or NTR 301).
[10]These electives must not be remedial, nor taken at an elementary level after the student has taken comparable course work at an advanced level, nor should it contain material presented in a previous course.
[11] Foreign language proficiency at the FL_ 102 level is required for graduation.
** Freshman and sophomore courses in the SZO and SZM curricula are now being revised. Please consult the departmental undergraduate advising office for any changes.

## MINOR IN ZOOLOGY

A minor in zoology is available to undergraduates majoring in any department other than zoology. This minor will be useful to students applying to professional schools such as medicine, dentistry, veterinary medicine, and other health sciences. Basic knowledge in animal biology may also be useful to students seeking careers in government, industry, or education. The minor consists of a minimum of 15 credit hours, including two core courses, ZO 205 and ZO 208. The remaining courses must be selected from three- or four-credit courses at the 300 or 400 level with at least one course having a laboratory.

# SCIENCE PROGRAM IN MEDICAL TECHNOLOGY

J. F. Roberts, *Undergraduate Coordinator*

Two programs are available in medical technology. The first is a four-year collegiate curriculum with a Bachelor of Science degree in Zoology (see above) followed by a year of training in any hospital clinical laboratory approved by the American Medical Association (the 4 + 1 program). The second program is designed to be completed in four calendar years. The student takes the prescribed curriculum

(see below) for three years at North Carolina State University and a fourth year (12 months) of clinical training at an affiliated hospital (the 3 + 1 SZM curriculum). Successful completion of this program qualifies the student for a Bachelor of Science degree in medical technology from NC State. Acceptance by the clinical laboratory is competitive and students in either program outlined above must apply for clinical training. After completion of either program the student is eligible to take the national examination for certification as a registered Medical Technologist.

## CURRICULUM IN MEDICAL TECHNOLOGY

### Degree earned: B.S. in Medical Technology

Note: This is a suggested order of courses. As long as prerequisites are observed, and specific semester restrictions are observed (see footnotes), courses may be taken in other semesters.

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 107 Precalculus I | 3 |
| Any 100-level PE in Fitness & Wellness [1] | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 121 Elements of Calculus *or* | |
| MA 131 Analytic Geom. & Calculus A[3] | 4 |
| Humanities/Soc. Sci. Electives[2] | 6 |
| Physical Education Elective[1] | 1 |
| | 18 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| PY 211 College Physics I. | 4 |
| ZO 201 General Zoology | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective [1] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BAE 121 Computer Applic. in ALS *or* | |
| CSC 200 Intro.to Computer & Uses | 3 |
| CH 221 Organic Chemistry I | 4 |
| PY 212 College Physics II | 4 |
| ZO 303 Vertebrate Zoology | 3 |
| ZO 304 Vertebrate Zoology Lab | 1 |
| Physical Education Elective [1] | 1 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| GN 301 Genetics in Human Affairs *or* | |
| GN 411 Prin. of Genetics | 3-4 |
| MB 351 General Microbiology | 4 |
| Humanities/Soc. Sci. Electives[2] | 6 |
| | 17-18 |

| *Spring Semester* | *Credits* |
|---|---|
| COM 110 Public Speaking *or* | |
| COM 112 Interpersonal Comm. *or* | |
| COM 146 Bus. & Professional Comm. *or* | |
| COM 211 Argument & Advocacy | 3 |
| MB 411 Medical Microbiology | 4 |
| ZO 305 Cellular & Animal Physiology Lab[4] | 2 |
| ZO (BO) 414 Cell Biology *or* | |
| ZO 421 Prin. of Physiology | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 15 |

Subtotal credit hours for 3 + 1 program ..... 97-98

Twelve-month course in Medical Technology at one of the affiliated hospital programs.

Microbiology — 30 hours
Clinical Chemistry
Hematology
Histology & Cytology

Minimum Hours Required for Graduation ..... 127-128

The affiliated hospitals are:
Bowman Gray School of Medicine, Winston-Salem, NC
Carolinas Medical Center, Charlotte, NC
Moses H. Cone Hospital, Greensboro, NC

NOTE: Foreign language proficiency at the FL_ 102 level is required for graduation.

## ALTERNATE FOURTH YEAR B.S. IN ZOOLOGY PROGRAM
## Degree earned: B.S. in Zoology

SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| Advanced Writing Elective[3] | 3 | Restricted Elective[3] | 3 |
| Restricted Elective[3] | 3 | Zoology Elective[7] | 7 |
| Zoology Elective[7] | 3 | Free Electives[8] | 6 |
| Zoology Lab Elective[4] | 2 | | 16 |
| Free Elective[1] | 3 | | |
| | 14 | | |

Minimum Hours Required for Graduation ..... 127

[1]Four semesters of physical education (PE) credit are required for graduation; the first two hours of PE taken may be counted for Free Elective credit. If the student chooses not to count these first two hours as Free Elective credit, these hours will not count toward graduation and two additional hours of Free Elective credit must be completed prior to graduation. **NOTE:** In the Medical Technology program, the first two physical education courses must count for free elective credit.

[2]Among 21 credits of Humanities & Soc. Sci. (HSS), the student must take one history; one literature; one course in philosophy, religion or visual/performing arts (develops aesthetics, creativity and judgment); two courses from psychology, politics, economics (recommended), government, sociology, anthropology or cultural geography; two additional courses from any approved HSS lists. One of the above must come from the approved Gen. Ed. Requirements list of Courses on Non-English Speaking Cultures and one from the Science, Technology & Society (Humanities Perspective) list of courses.

[3]If you wish to elect MA 231 later as an elective, take MA 131 and not MA 121

[4]One of the written lab reports must include a detailed library search and will be a major paper. ZO 305 must be taken in the Junior year; if not, another course with a designated major paper requirement must be taken in the Junior year.

[5]The student must take a technical writing course (ENG 331, 332, 333) in which the Senior year paper will be written. Students in the clinical year of the 3+1 program must complete at least one significant paper or detailed lab report in one or more clinical courses

[7]Choose from courses listed in the Undergraduate Catalog, College Agri. & Life Sciences Group A (Physical and Biological Science). Recommended are: any Zoology or Fisheries & Wildlife courses (except ZO 201, ZO 205, ZO 208 and ZO 212), BO 200, BCH 451, BCH 452, CH 315, ST 311. Select these on the basis of your interests and career goals.

[7]As in other Zoology curricula, students in the 4 + 1 medical technology program must choose from the 4 different course groupings (levels) below; at least one course per level for a total of 15 credits. By the end of the Junior year the student will have taken ZO 303/304 (fulfilling the Organismal Level) and either ZO 421 (System Level) or ZO 414 (Cellular & Molecular Level); therefore, the student must select one course from the Supraorganismal Level and one from either the System Level or the Cellular & Molecular Level depending on whether the student took ZO 421 or ZO 414. Should the student become interested in medicine, note that some medical/dental schools require vertebrate zoology (ZO 303/304) or anatomy (ZO 370/375 and 317/376).

*Organismal Level*
- ZO 303 (3)
- ZO 315 (3)
- ZO 402 (2)
- ZO 441 (3)

*System Level*
- ZO 361 (3)
- ZO 370 (3)
- ZO 371 (3)
- ZO 421 (3)

*Cellular & Molecular Level*
- BCH 451 (4)
- BO/ZO 414 (3)
- ZO 370 (3)
- ZO 371 (3)

*Supraorganismal Level*
- BO/ZO 360 (3)
- ZO 410 (3)
- ZO 450 (3)

[8]Choose a lab course or courses from the approved Zoology list (3 credit hours). The student should remember that ZO 304 is taken previously for one credit:

*Zoology Lab Courses*
- BCH 452 (2)
- GN 412 (1)
- ZO 304 (1)-ZO 303 (3) is a corequisite
- ZO 365 (1)-ZO 360 (3) is a corequisite
- ZO 375 (2)
- ZO 376 (2)
- ZO 403 (2)
- ZO 442 (1)
- ZO 460 (2)
- ZO 480 (3)

[9]These electives must not be remedial, nor taken at an elementary level after the student has taken comparable course work at an advanced level, nor should it contain material presented in a previous course.

# PROGRAM IN FISHERIES AND WILDLIFE SCIENCES

Turner House, 110 Brooks Avenue

R. L. Noble, *Undergraduate Coordinator*

The Departments of Zoology and Forestry jointly administer the program in Fisheries and Wildlife Sciences. Undergraduate education emphasizes ecological principles and their application to research problems and natural resource management needs. Majors are well prepared for graduate work and entry-level professional positions.

# CURRICULUM IN FISHERIES AND WILDLIFE SCIENCES, CONCENTRATION IN FISHERIES SCIENCE
## Degree earned: B.S. in Fisheries and Wildlife Sciences

**Note:** This is a suggested order of courses. As long as prerequisites are observed, and specific semester restrictions are observed (see footnotes), courses may be taken in other semesters.

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 131 Analytic Geom. & Calculus A | 4 |
| Any 100-level PE in Fitness & Wellness[1] | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| COM 110 Public Speaking | 3 |
| ENG 112 Comp. & Reading | 3 |
| ZO 201 General Zoology | 4 |
| Physical Education Elective[1] | 1 |
| | 15 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| FW (FOR, ZO) 221 Conserv. Natural Resources | 3 |
| PY 131 Conceptual Physics *or* | |
| PY 211 College Physics I | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 201 Intro.Agric. Res. Economics *or* | |
| EC 201 Intro. to Economics I | 3 |
| BO 200 Plant Life | 4 |
| CH 220 Intro. Organic Chemistry | 4 |
| Quantitative Science Elective[3] | 3 |
| Physical Education Elective[1] | 1 |
| | 15 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BO 360 Intro. to Ecology | 3 |
| BO 365 Ecology Lab | 1 |
| FW (ZO) 420 Fisheries Science | 3 |
| PS 201 Intro. to American Govt. | 3 |
| ST 311 Intro. to Statistics | 3 |
| Advised Elective[4] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| GN 301 Genetics in Human Affairs | 3 |
| Advised Elective[4] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Restricted Elective[5] | 3 |
| Zoology Elective[6] | 3 |
| | 15 |

### SUMMER TRAINING PROGRAM

FW (FOR) 310 Fisheries & Wildlife Inventory & Mgmt. ..... 6

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 333 Comm. for Sci. & Research | 3 |
| FW (ZO) 353 Wildlife Mgmt. | 3 |
| ZO 419 Limnology | 4 |
| ZO 441 Biology of Fishes | 3 |
| ZO 442 Biology of Fishes Lab | 1 |
| Humanities/Social Science[2] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| FW (ZO) 430 Fish. Wildlife Admin. | 3 |
| Advised Elective[4] | 5 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Science Elective[7] | 4 |
| | 15 |

Minimum Hours Required for Graduation ..... 128

General Note: Foreign Language proficiency at the FL_ 102 level is required for graduation.

[1]Four semesters of physical education (PE) are required for graduation, including PE 10_ , however only two credit hours are applicable toward the 128 credits required for the degree.
[2]Among the 15 hours of elective Humanities and Social Sciences (HSS), the student must take one history, one literature, one course in philosophy, religion or visual/performing arts, and two additional courses from any approved HSS lists. One of these five courses must come from the approved list of courses on Non-English Speaking Cultures.
[3]Choose from BAE 121, CSC 200, MA 214 or MA 231.
[4]Total of 11 credits of advised electives applicable to academic and career goals are to be chosen in consultation with the advisor and must be 200 level or higher. See list of approved courses below.
[5]Choose from FW(FOR) 404, FW 485, FW(Z0) 515, FW(Z0)553, FW(ZO) 586 or BO 403.
[6]Choose from ZO 205, ZO 212, ZO 303, ZO 402 and 403, or ZO 410.
[7]Choose from soil science, marine/earth/atmospheric sciences, or from advanced courses in physics, chemistry, mathematics or computer science.

Advised Electives, Fisheries Concentration (SFF)

| | |
|---|---|
| BAE(SSC) 323 | Water Management 3(2-2)F |
| BO 400 | Plant Diversity 4(3-3)F |
| BO 403 | Systematic Botany 4(2-4)S |
| BO(MB) 574 | Phycology 3(1-4)S Alt. yrs. |
| FOR 353 | Air Photo Interpretation 3(2-3)F |
| FOR 401 | Forest Hydrology and Watershed Management 4(3-3)F |
| FOR 472 | Renewable Resource Policy and Mgmt. 3(3-0)F |
| FOR(MDS) 584 | Environmental Impact Assessment 4(0-8)F Alt. yrs. |
| FW(FOR) 404 | Forest Wildlife Management 3(3-0)S |
| FW 485 | Natural Resources Advocacy 3(2-3)S |
| FW(ZO) 515 | Fish Physiology 3(2-3)F Alt. yrs. |
| FW(ZO) 553 | Principles of Wildlife Science 3(2-3)F |
| FW(ZO) 586 | Aquaculture I 3(3-0)F |
| FW(ZO) 587 | Aquaculture I Lab 1(0-3)F Alt. yrs. |
| MB 351 | General Microbiology 4(3-3)F,S |
| MEA(ZO) 220 | Marine Biology 3(3-0)S |
| MEA(ZO) 520 | Principles of Biological Oceanography 3(3-0)S |
| NTR(ANS,FS) 301 | Intro.Modern Nutrition 3(3-0)F,S |
| NTR(ANS,PO) 415 | Comparative Nutrition 3(3-0)F |
| SSC 200 | Soil Science 4(3-3)F,S |
| ZO 205 | Intro.Cellular and Developmental Zoology 4(4-0)F |
| ZO 212 | Basic Anatomy and Physiology 4(4-0)S |
| ZO 303 | Vertebrate Zoology 4(3-3)F,S |
| ZO 315 | General Parasitology 3(2-3)S |
| ZO 402 | Invertebrate Zoology 2(2-0)S Alt. yrs. |
| ZO 410 | Animal Behavior 3(3-0)F |
| ZO 460 | Aquatic Natural History Lab 2(0-6)S |

| | |
|---|---|
| ZO 593 | Aquatic Ecology Seminar 1-3, F,S |
| *BAE 121 | Computer Applications in ALS 3(1-6)F,S |
| *CSC 200 | Intro. to Computers 3(2-2)F,S |

*For students who fulfilled quantitative requirement with a non-computer course.

## CURRICULUM IN FISHERIES AND WILDLIFE SCIENCES CONCENTRATION IN WILDLIFE SCIENCE
## Degree earned: B.S. in Fisheries and Wildlife Sciences

**Note:** This is a suggested order of courses. As long as prerequisites are observed, and specific semester restrictions are observed (see footnotes), courses may be taken in other semesters.

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ALS 103 Intro. Topics in ALS | 1 |
| BIO 125 General Biology | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 131 Analytic Geom. & Calculus A | 4 |
| Any 100-level PE in Fitness & Wellness | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| COM 110 Public Speaking | 3 |
| ENG 112 Comp. & Reading | 3 |
| ZO 201 General Zoology | 4 |
| Physical Education Elective[1] | 1 |
| | 15 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| FW (FOR, ZO) 221 Conserv. Natural Resources | 3 |
| PY 131 Conceptual Physics *or* | |
| PY 211 College Physics I | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 201 Intro.Agric. Res. Economics *or* | |
| EC 201 Intro. to Economics I | 3 |
| BO 200 Plant Life | 4 |
| CH 220 Intro. Organic Chemistry | 4 |
| Quantitative Science Elective[3] | 3 |
| Physical Education Elective[1] | 1 |
| | 15 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BO 360 Intro. to Ecology | 3 |
| BO 365 Ecology Lab | 1 |
| FW (ZO) 353 Wildlife Mgmt. | 3 |
| PS 201 Intro. to American Govt. | 3 |
| ST 311 Intro. to Statistics | 3 |
| Advised Elective[4] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| FW (FOR) 404 Forest Wildlife Mgmt. | 3 |
| GN 301 Genetics in Human Affairs | 3 |
| Advised Elective[4] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Zoology Elective[5] | 3 |
| | 15 |

SUMMER TRAINING PROGRAM

FW (FOR) 310 Fisheries & Wildlife Inventory & Mgmt. ..... 6

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 333 Comm. for Sci. & Research | 3 |
| FW (ZO) 420 Fisheries Science | 3 |
| Advised Elective[4] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Restricted Elective[6] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 403 Systematic Botany | 4 |
| FW (ZO) 430 Fish. Wildlife. Admin. | 3 |
| Advised Elective[4] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Science Elective[7] | 4 |
| | 17 |

Minimum Hours Required for Graduation ..... 128

General Note: Foreign Language proficiency at the FL_ 102 level is required for graduation.

[1]Four semesters of physical education (PE) are required for graduation, including PE 10_ , however only two credit hours are applicable toward the 128 credits required for the degree.
[2]Among the 15 hours of elective Humanities and Social Sciences (HSS), you must take one history, one literature, one course in philosophy, religion or visual/performing arts, and two additional courses from any approved HSS lists. One of these five courses must come from the approved list of courses on non-English Speaking Cultures.
[3]Choose from BAE 121, CSC 200, FOR(WPS) 273, MA 214 or MA 231
[4]Total of 12 credits of advised electives applicable to academic and career goals are to be chosen in consultation with your advisor. Must be 200 level or higher. See list of approved courses below.
[5]Choose from ZO 205, ZO 212, ZO 303, ZO 402 & ZO 403, or ZO 410.
[6]Choose from FW 485, FW(ZO) 553, ZO 419 or ZO 441.
[7]Choose from soil science, marine/earth/atmospheric sciences, or from advanced courses in physics, chemistry, mathematics or computer science.

Advised Electives, Wildlife Sciences Concentration (SFW)

| | | |
|---|---|---|
| FOR | 212 | Dendrology 4(2-4)F |
| FOR | 252 | Forest Science 3(2-3)S |
| FOR | 353 | Air Photo Interpretation 3(2-3)F |
| FOR | 472 | Renewable Resource Policy and Management 3(3-0)F |
| FOR | 584 | Environmental Impact Assessment 4(0-8)F |
| FW | 485 | Natural Resources Advocacy 3(2-3)S |
| FW(ZO) | 554 | Wildlife Field Studies 3(2-3)S Alt. yrs. |
| FW(FOR) | 594 | Seminar in Wildlife Management 1(1-0)S Alt. yrs. |
| MB | 401 | General Microbiology 4(3-3)F,S |
| NTR(ANS,FS) | 301 | Intro.Modern Nutrition 3(3-0)F,S |
| PO | 410 | Production and Mgmt. Game Birds in Confinement 3(2-3)S |
| PRT | 442 | Recreation and Park Interpretive Services 3(2-3)F |
| PS | 307 | Intro.Criminal Law in the United States 3(3-0)F,S |
| PS | 311 | Criminal Justice Policy Process 3(3-0)F,S |
| SSC | 200 | Soil Science 4(3-3)F,S |
| ZO | 205 | Intro.Cellular and Development Zoology 4(4-0)F |
| ZO | 212 | Basic Anatomy and Physiology 4(4-0)S |
| ZO | 303 | Vertebrate Zoology 4(3-3)F,S |
| ZO | 402 | Invertebrate Zoology 2(2-0)S |
| ZO | 410 | Animal Behavior 3(3-0)F |
| ZO | 419 | Limnology 4(3-3)F |
| ZO | 441 | Biology of Fishes 3(3-0)F |
| ZO | 442 | Biology of Fishes Lab 1(0-3)F |

| | | |
|---|---|---|
| ZO | 501 | Ornithology 3(2-3)S Alt. yrs. |
| ZO | 544 | Mammalogy 4(3-3)F |
| *BAE | 121 | Computer Application in ALS 3(1-6)F,S |
| *CSC | 200 | Intro. to Computers 3(2-2)F,S |

*For students who fulfilled quantitative requirement with a non-computer course.

# NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE

Patterson Hall, Room 100

D. F. Bateman, *Dean,* College of Agriculture and Life Sciences

J. C. Wynne, *Associate Dean,* College of Agriculture and Life Sciences, and *Director,* N.C.Agricultural Research Service

G. J. Kriz, *Associate Director,* N.C. Agricultural Research Service

E. Young, *Assistant Director,* N.C. Agricultural Research Service

S. A. Lommel, *Assistant Director,* N.C. Agricultural Research Service

W. K. Collins, *Coordinator,* Tobacco Programs, N.C.Agricultural Research Service

J. H. Britt, *Assistant Director,* N.C.Agricultural Research Service, *Associate Dean,* College of Veterinary Medicine

J. B. Jett, *Assistant Director,* N.C.Agricultural Research Service and *Associate Dean,* College of Forest Resources

H. Shaw, *Assistant Director,* N.C.Agricultural Research Service, and *Dean*, School of Human Environmental Sciences, University of N.C. at Greensboro

The North Carolina Agricultural Research Service is the agricultural, life sciences, forestry, and home economics research agency of the State of North Carolina. It is funded principally by appropriations from the North Carolina General Assembly, federal formula funds, grants and contracts.

The N.C. Agricultural Research Service provides the following public services:

- conducts research on the development and maintenance of an effective agricultural and forestry industry in North Carolina, including economically sound sources of

supplies and equipment needed in agriculture and forestry and market outlets for the products of agriculture and forestry;
- improves rural homes, rural life and rural environment;
- maintains a reliable supply of agricultural and forestry products for the consuming public. This requires research to solve current problems and research to provide a foundation of scientific knowledge in the biological, physical and social sciences.

The N.C. Agricultural Research Service faculty brings well-trained personnel to the university whose teaching in many specialized fields of agriculture, biology and the social sciences assures the maintenance of curricula of high standards. It contributes to the advanced training of students who are destined to become the leaders, teachers and investigators necessary in the maintenance of a viable agriculture and forestry industry.

### PUBLICATIONS

The N.C.Agricultural Research Service publishes bulletins and scientific papers on research conducted by the staff. Copies of bulletins may be obtained from the Department of Agricultural Communications and scientific papers from authors.

### SERVICES

The faculty of the N.C.Agricultural Research Service conduct original and other research bearing directly on and contributing to the establishment and maintenance of permanent and effective agricultural and forestry industries in North Carolina. This research includes field and laboratory experimentation in the biological, physical, social, and environmental sciences. Primary emphasis is given to the production, processing, distribution, and consumption of the many agricultural and forestry commodities produced throughout the state. Also, major attention is given to research programs aimed at improving the quality of life of both rural and urban peoples.

## COOPERATIVE EXTENSION SERVICE

Ricks Hall, Room 104

D. F. Bateman, *Dean,* College of Agriculture and Life Sciences

B. E. Caldwell, *Interim Director,* Cooperative Extension Service

R. E. Phillips, *Associate Director,* Cooperative Extension Service

M. A. Corbin, *Assistant Director,* Home Economics

R. G. Crickenberger, *Interim Assistant Director,* ANR - CRD

M. A. Davis, *Interim Assistant Director,* 4-H and Youth

E. M. Prosise, *Interim Assistant Director,* County Operations

R. W. Shearon, *Assistant Director,* Program Staff and Organizational Development

The Cooperative Extension Service of North Carolina State University is a cooperative undertaking among the United States Department of Agriculture, the State of North Carolina, the 100 counties in the state and the Cherokee Indian Reservation. Its work is supported by federal funds made available under the Smith-Lever Act of 1914, as amended by state and county appropriations, and by grants and contracts.

The federal and state appropriations are used to maintain an administrative and specialist staff and to pay a portion of the salary and the travel expenses of the county extension agents. Under this cooperative arrangement, the Cooperative Extension Service serves as the "educational arm" of the United States Department of Agriculture and as the "field faculty" of North Carolina State University in the areas of agriculture and natural resources, family living, 4-H and youth, and community and rural development.

The primary purpose of the North Carolina Cooperative Extension Service is to provide the people of the state with the latest and best information--particularly that which is related to agriculture and natural resources, home economics and youth, and rural development--and help them to interpret and use this information in building a more prosperous and satisfying life.

This program has sufficient flexibility to permit special attention to the problems, needs and interests of the people in each county. County Advisory Councils are utilized to determine and prioritize the county educational program content. Assistance is given to individuals, families, communities, agricultural and seafood processing and marketing firms, other businesses and certain organizations. This includes work with adults and youth in both the city and rural areas.

In carrying out this educational program, a variety of methods and techniques are employed: method and result demonstrations; meetings; visits to farms, homes and businesses; organized groups of men, women and youth; tours; leaflets, pamphlets and other printed materials and mass media.

The basic sources of information to be taught through this educational program are the findings and recommendations resulting from research conducted by the Agricultural Research Service in this and other states and by the United States Department of Agriculture.

## AGRICULTURAL INSTITUTE

Patterson Hall, Room 107

D. F. Bateman, *Dean,* College of Agriculture and Life Sciences

J. L. Oblinger, *Associate Dean,* College of Agriculture and Life Sciences, and *Director,* Academic Programs

The Agricultural Institute is a two-year academic program which awards the Associate in Applied Science Degree upon successful completion of at least one of eight curricula. The Agricultural Institute provides education and training in food, pest control, agriculture, horticulture, turfgrass management and agribusiness. It is part of the academic programs in the College of Agriculture and Life Sciences at North Carolina State University. Provision for the Agricultural Institute was made by the 1959 North Carolina General Assembly and instruction began in the Fall, 1960. The objective of the Agricultural Institute is to provide technical training for those desiring a comprehensive education in the food and agricultural sciences, agribusiness and related areas.

The instructional programs of the Agricultural Institute are organized and conducted as part of the overall academic program in the College of Agriculture and Life Sciences. The Agricultural Institute is an addition to, and not a substitute for, the college's regular degree-granting program. The Agricultural Institute uses the same facilities (classrooms, laboratories, farms) as the four-year program. The facilities are used extensively for both teaching and observing the application of technology in agriculture and other closely related areas.

The faculty of the four-year program are responsible for organizing and teaching courses offered by the Agricultural Institute. Emphasis is placed on practical knowledge and training, with many courses requiring laboratories using hands-on

experience. The Agricultural Institute offers majors in eight areas: Agribusiness Management; Agricultural Pest Control; Field Crops Technology; Food Processing, Distribution and Service; General Agriculture; Livestock Management and Technology; Ornamentals and Landscape Technology; and Turfgrass Management.

## OPPORTUNITIES

Rapid technical advancement has been important in changing agriculture from a small production industry to the nation's largest industry. Closely associated with production agriculture are those areas related to recreation and beautification such as turfgrass management, landscaping and ornamental plants. Increased production and consumer demand for convenience-type foods have stimulated the food processing industry, in turn increasing food distribution requirements.

Today's complex agriculture requires a large work force. This work force must have some technical training and be able to deal with a vast array of problems and opportunities. Graduates of the Agricultural Institute have the education and training that is in demand by the food and agricultural industries and that permit them to assume responsible positions in the agriculture and allied fields. Some career examples include farm and herd managers, golf course superintendents, nursery managers, pest control specialists, quality control technicians, food service supervisors, sales and service of agricultural equipment and products, food inspectors, lawn care specialists and others. More job opportunities than graduates make salaries attractive and competitive.

The College of Agriculture and Life Sciences maintains a Career Services Office to assist graduates in addressing resume construction, interviewing strategies, successful job search techniques, location of summer internships, and job market trends.

## ENTRANCE REQUIREMENTS

Any individual who has received a diploma from an accredited high school or has passed the high school equivalency examination administered by the Department of Community Colleges is eligible for admission consideration. Each application will be reviewed and evaluated by the Director of the Agricultural Institute.

For additional information write: Director, Agricultural Institute, Box 7642, 107 Patterson Hall, North Carolina State University, Raleigh, NC 27695-7642, Telephone (919) 515-3248.

The World Wide Web site is located at: http://www2. ncsu.edu/ncsu/cals/agi.

## PROGRAMS OF STUDY

Graduates of the Agricultural Institute are awarded the Associate in Applied Science degree. The eight programs of study are Agribusiness Management; Agricultural Pest Control; Field Crops Technology; Ornamentals and Landscape Technology; Food Processing, Distribution, and Service; General Agriculture; Livestock Management and Technology (general livestock option, poultry option,and swine option); Turfgrass Management.

# SCHOOL OF DESIGN

*200 Brooks Hall*
*NCSU Box 7701*
*Raleigh, NC 27695-7701*

*Phone:* *(919) 515-8310*
*Fax:* *(919) 515-7330*
*Internet E-mail:* *sodwebpage@ncsu.edu*

Marvin J. Malecha, *Dean*

Susan Brandeis, *Associate Dean for Undergraduate Studies and Academic Affairs*

Caroline Carlton, *Librarian, Design Library*

William K. Bayley, *Director, Multi-Media Lab*

Chris Jordan, *Director, Materials Processing Laboratory*

Marva Motley, *Director of Student Life and Coordinator of African-American Affairs*

Martha Scotford, *Associate Dean for Graduate Studies, Research, Outreach and Extension*

Now in its fifth decade, the School of Design at North Carolina State University has concerned itself from the beginning with preparing designers who, in the broadest sense, shape the world. Design education is more than an attempt to teach a set of technical skills. The environment - including the spaces in which people live and work, the products they consume, and the messages they receive - have a powerful impact on how humans function as a society. Good design, therefore, requires attention and sensitivity to social, economic, political, cultural, and behavioral issues. The aim of all design curricula in the School of Design is to develop the designer's perception, knowledge, skills, and problem-solving abilities.

The School of Design admits students through a selective process that ensures a highly motivated and heterogeneous design community. The entering student body consistently ranks at the top of academic achievement in the university and the School's graduation rates are the highest in the institution. While providing undergraduate and graduate study in multiple disciplines and encouraging individual plans of study, the School functions as a unified, interactive education center,

dedicated to preparing designers capable of shaping the environment to various scales, but always in response to society's need's.

## WORLD WIDE WEB

Visit the School of Design at: http://www2.ncsu.edu/ncsu/design/

## DESIGN FUNDAMENTALS - The First Year Experience

All students entering the School of Design are admitted directly into Design Fundamentals and only declare majors in the second semester of that common experience. The first year experience consists of a common two semester studio course sequence. Each semester studio earns 6 credit hours and meets 9 hours per week. The work outside the class is substantial and is largely carried out in the same communal studio space, with students working both independently and in collaboration to solve the problems posed in the class. Most class time is spent in either hands-on work, discussion, demonstration, critique, or field trips. Emphasis is on interaction, independence, self-discipline, and self-motivation.

- The first semester studio (DF101) focuses on the basic vocabulary and skills common to all designers in all disciplines. This includes the basics of composition, an awareness of the impact of design on culture and the environment, and mastery of basic hand skills with materials and tools. Design process is discussed and practiced so that students learn the value of generating alternative solutions before refining and producing them. Weekly "orientation" lectures provide pertinent topical information and expose students to a variety of faculty and ideas in the School.
- The second semester studio (DF102) focuses on the application of the basic information learned in the first semester to problems that are typical of the professions represented by current school curricula-architecture, landscape architecture, graphic design, industrial design (including textile design) and art and design (including the fine arts of painting, drawing, sculpture, illustration, photography, printmaking and the fiber arts). Projects involve working at a variety of scales-from small hand-held objects to outdoor installations. This second semester is designed to give students basic exposure to the essential concerns of each discipline, as well as to assist them in making a choice for later study.

In both semesters, the fundamentals experience emphasizes learning to use the design process, establishing disciplined working habits, talking about the work to others (communication with the language learned in the class), and working in collaboration with others, thus forming the foundation of all subsequent design work in the School and in the design professions.

## CURRICULA AND DEGREES

The School of Design offers undergraduate instruction leading to the four-year Bachelor of Environmental Design in Architecture, Bachelor of Art and Design, Bachelor of Industrial Design, and Bachelor of Graphic Design, as well as five-year degree programs leading to the Bachelor of Architecture and the Bachelor of Landscape Architecture. The General Education component of each curriculum consists of courses in mathematical and natural sciences, writing and speaking, foreign language, humanities and social sciences, physical education, science/technology/society, and communication and information technology. In addition to six-credit design studios where students apply their expanding knowledge and skills to theoretical and practical design problems, majors in the School of Design take support courses dealing with design knowledge and skills, such as communication and presentation, human behavior, environment, history, philosophy, physical elements and systems, methods and management.

After a common Design Fundamentals program in the first year, students select a disciplinary major. The curriculum path is flexible, affording students the opportunity to concentrate in one area while making contact with the other design disciplines. In addition to their faculty mentors, students are exposed to a broad range of design professionals through guest lectures, juries, projects and workshops.

Graduate studies are designed for students who want to build on undergraduate education and professional experience, as well as for those who come from non-design backgrounds and want to pursue advanced design degrees. The school offers graduate study in the Master of Architecture, Master of Graphic Design, Master of Industrial Design, and Master of Landscape Architecture programs. Please refer to the NC State University Graduate Catalog for curriculum information on Master's programs in the School of Design.

****University Physical Education requirements have been modified. It is recommended that students consult with their adviser on specific curriculum requirements regarding PE.*

## DaVINCI SCHOLARS PROGRAM

This joint program between the School of Design and the College of Humanities and Social Sciences allows students to earn two undergraduate degrees within five or six years*: a bachelor's degree in one of the five undergraduate disciplines in the School of Design and a B.A. or B.S. degree in the College of Humanities and Social Sciences.

The primary purpose of the double degree is to provide students with a strong liberal education as a complement to their professional degree study. In some cases, however, students will also improve their employment opportunities by selecting study that directly supports their professional interests in design. For example, students majoring in Graphic Design, with a second degree that focuses on writing, may improve their opportunities for employment in communications. A student in Architecture with a second degree in history may improve opportunities for focused graduate study in architectural history, preservation, or urban planning. Study of foreign language may improve students' opportunities for international design practice.

DaVinci Scholars will earn their first degree in design with no adjustment in their design requirements. They will elect a second major from any of those available in the College of Humanities and Social Sciences, including a Multidisciplinary Studies major (admission to the MDS program requires a statement of intent and proposed interdepartmental curriculum that must be approved by the MDS Degree Committee.) Most students will complete their second degree within one additional year of study or two summer sessions plus one additional semester.

Students will be designated as DaVinci Scholars only during their first year of enrollment in the School of Design. To qualify for the DaVinci Scholars Program, students must:

- present a minimum Dean's List GPA at the end of their first semester of study in the School of Design
- declare interest in the DaVinci Scholars Program in writing to the Associate Dean of the School of Design within their first year of study in the School of Design
- be selected by a review panel composed of three faculty in the School of Design and three faculty in the College of Humanities and Social Sciences and chaired by the Associate Dean in the School of Design.

For more information, please contact the Associate Dean for Undergraduate Studies and Academic Affairs, School of Design, 200B Brooks Hall, Box 7701, NCSU, Raleigh, NC 27695-7701; 919/515-8316.

# DEPARTMENT OF ARCHITECTURE

Brooks Hall

C. A. Saccopoulos, *Head*
J.P. Rand, *Director of Graduate Programs*

*Alumni Distinguished Undergraduate Professors:* J.P. Rand, P. Tesar; *Professors:* P. Batchelor, G. Bizios, R. Burns, R. Clark, M. Malecha, W. Place, J. Reuer, C.A. Saccopoulos, H. Sanoff, P. Tesar; *Associate Professors:* F. Harmon, J. P. Rand, F. Rifki, J. Tector; *Assistant Professors:* S. Roe, R. Spears; *Associate Professor Emeritus:* D. W. Barnes; *Adjunct Professors:* C. Bishir, J. Mann, W. H. McKinnon; *Research Professor:* R. Mace; *Visiting Professor:* E.F. Harris Jr.; *Adjunct Lecturer:* T. C. Howard

In a world of changing conditions - social-, cultural, economic and technological - the central task of the architect remains to give meaningful form to the physical environment. These rapid changes, however, force today's architects to not only concern themselves with traditional design issues like shelter, appropriateness, comfort and beauty but also to address emerging concerns like environmental conservation, rapidly expanding urban centers and towns, adaptive use and preservation of older buildings, providing built environments in a global market, and new means of producing architecture. The aesthetic revolution of the past few decades has also freed architects from the rigidity of earlier theory allowing greater diversity and expressiveness in architectural design.

The Department of Architecture has addressed the diversity of roles and responsibilities in architecture through its faculty and its curricula. Its distinguished faculty embraces a broad definition of the practice of architecture and is, therefore, free of a singular, dogmatic, or stylistic bias. This diversity is evident in their experience, areas of interest, national origins, and educational backgrounds. The curriculum is designed to provide opportunities for students to encounter faculty in both classes and informal activities.

The architecture curriculum balances professional studies with a broad general education. University requirements in mathematics, English, natural sciences and humanities are integrated with architectural design studios and a rich selection of design support courses. The design studio - a working laboratory in which the student under the guidance of a professor learns how to design buildings - is central to the curriculum.

The undergraduate Bachelor of Environmental Design is a pre-professional degree that stresses the education of the individual and serves as the foundation for advanced, professional study in the discipline. The first year is spent on design fundamentals in studio common to all students in the School of Design. In the following years students receive a broad introduction to architectural design, theory, history, technology, and design processes while exploring educational opportunities within the university.

Following the pre-professional program students may continue their studies in either of two professional programs: the one-year, post-graduate Bachelor of Architecture or the two-year Master of Architecture program (see the *Graduate Catalog* for information on the latter program). Entry into both of these programs is competitive - to be accepted students must demonstrate potential for professional accomplishment capability in design, and satisfy a specific set of professionally-oriented undergraduate requirements. Many students spend one or more years gaining professional experience in architecture firms or related fields before pursuing the advanced degrees.

Educational enrichment is an important characteristic of the architectural program. The School of Design regularly presents public lectures by leading professionals and exhibitions of design and art work. Electives are available in related disciplines - painting, sculpture, photography, landscape architecture, industrial design, and program, a variety of foreign study programs, and field trips to buildings an urban centers of architectural interest.

## OPPORTUNITIES

Graduates with the pre-professional Bachelor of Environmental Design in Architecture degree pursue careers in architectural offices, building construction, development, and public agencies. North Carolina and many other states have restricted professional licensing in architecture to holders of accredited professional degrees such as the Bachelor of Architecture and the Master of Architecture. This educational requirement must be followed by three years of professional internship and completion of a comprehensive examination to qualify for professional certification as an architect.

# CURRICULUM IN ARCHITECTURE
## Degree earned: Bachelor of Environmental Design in Architecture

### FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ARC 141 History of Design I | 3 | ARC 142 History of Design II | 3 |
| DF 101 Design Fundamental Studio | 6 | DF 102 Design Fundamental Studio | 6 |
| ENG 111 Comp. & Rhetoric | 3 | ENG 112 Comp. & Rhetoric | 3 |
| Math Elective[5] | 3 | Math Elective[4] | 4 |
| Any 100-level PE in Fitness & Wellness [1] | 1 | Physical Education Elective [2] | 1 |
| | 16 | | 17 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ARC 211 Natural Systems & Architecture | 3 | ARC 202 Arch. Design/Environment | 6 |
| ARC 261 Discipline of Architecture | 3 | ARC 232 Structures & Materials | 3 |
| ARC 400 Architectural Design[2] | 6 | ARC 252 Computer Methods in Arch. | 3 |
| History/Literature Elective[4] | 3 | Natural Science Elective[4] | 4 |
| Humanities/Soc.Sci.Elective[4] | 3 | Physical Education Elective [1] | 1 |
| | 18 | | 17 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ARC 331 Architectural Structures I | 3 | ARC 302 Arch. Design: Technology | 6 |
| ARC 400 Architectural Design[2] | 6 | ARC 332 Architectural Structures II | 3 |
| Natural Science Elective[4] | 4 | History/Literature Elective[4] | 3 |
| Writing/Speaking Elective[4] | 3 | Humanities/Soc.Sci.Elective[4] | 3 |
| Physical Education Elective [1] | 1 | | 15 |
| | 17 | | |

### SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ARC 400 Architectural Design[2] | 6 | ARC 402 Arch. Design: History | 6 |
| ARC 432 Arch. Construction Systems[3] | 3 | ARC 414 Environ. Control Systems[3] | 3 |
| ARC 441 History. of Contemporary Architecture[3] | 3 | Sci.,Technology,Soc. Elective[4] | 3 |
| Natural Science Elective[4] | 3 | Phil.,Relig., Vis./Perf. Arts[4] | 3 |
| | 15 | | 15 |

Minimum Hours Required for Graduation ..... 128

[1]Four semesters of Physical Education are required for graduation; two are included in the minimum hours for graduation.
[2]One of the three ARC 400 Architecture Studios may be substituted with another 400 level, 6 credit hour, design studio in another discipline in the school. No more than one studio may be taken in any semester.
[3]If a student does not wish to pursue a professional degree, such as Bachelor of Architecture or Master of Architecture, a 400- or 500-level elective chosen from any department in the School of Design may be substituted for a maximum of two of these courses.
[4]Must be chosen from specific School of Design approved General Education Lists of Electives.
* In order to receive two degrees from the School of Design, a student must complete 30 credit hours above the 128 credit hour requirement. These additional 30 credits are to include 18 credits in 400 level studios in the second discipline and 12 credits in design electives in the second discipline.
* Students who wish to switch majors within the School of Design are advised to check regarding the application of their general education requirements toward a degree in the new major. Requirements vary among departments.

[1]Foreign language proficiency at 101/102 levels are required for graduation but do not count toward the degree requirements.

## CURRICULUM IN ARCHITECTURE
## FIFTH YEAR PROFESSIONAL PROGRAM
## Degree earned: Bachelor of Architecture

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ARC 141 History of Design I | 3 | ARC 142 History of Design II | 3 |
| DF 101 Design Fundamental Studio | 6 | DF 102 Design Fundamental Studio | 6 |
| ENG 111 Comp. & Rhetoric | 3 | ENG 112 Comp. & Rhetoric | 3 |
| Math Elective[3] | 3 | Math Elective[3] | 4 |
| Any 100-level PE in Fitness & Wellness [1] | 1 | Physical Education Elective [1] | 1 |
| | 16 | | 17 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ARC 211 Natural Systems & Architecture | 3 | ARC 202 Arch. Design:Environment | 6 |
| ARC 261 Discipline of Architecture | 3 | ARC 232 Structures & Materials | 3 |
| ARC 400 Architectural Design[2] | 6 | ARC 252 Computer Methods in Arch. | 3 |
| History/Literature Elective[3] | 3 | Natural Science Elective[3] | 4 |
| Humanities/Soc.Sci.Elective[3] | 3 | Physical Education Elective [1] | 1 |
| | 18 | | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ARC 331 Architectural Structures I | 3 | ARC 302 Arch. Design: Technology | 6 |
| ARC 400 Architectural Design[2] | 6 | ARC 332 Architectural Structures II | 3 |
| Natural Science Elective[3] | 4 | History/Literature Elective[3] | 3 |
| Writing/Speaking Elective[3] | 3 | Humanities/Soc.Sci.Elective[3] | 3 |
| Physical Education Elective [1] | 1 | | 15 |
| | 17 | | |

SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ARC 400 Architectural Design[2] | 6 | ARC 402 Arch. Design: History | 6 |
| ARC 432 Arch. Construction Systems | 3 | ARC 414 Environ. Control Systems | 3 |
| ARC 441 History of Contemporary Architecture | 3 | Sci.,Technology,Soc. Elective[3] | 3 |
| Natural Science Elective[3] | 3 | Phil.,Relig.Vis./Perf. Arts[3] | 3 |
| | 15 | | 15 |

At the completion of four year study (128 credit Hours) the Bachelor of Environmental Design in Architecture is granted. An application to the Fifth Year is required. If accepted to the Program students will follow this course of study:

FIFTH YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARC 501 Professional Architecture Studio I | 6 |
| ARC 581 Final Project Preparation | 3 |
| Architecture Elective | 3 |
| Architecture Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ARC 502 Professional Architecture Studio II | 6 |
| ARC 561 Practice of Architecture | 3 |
| Architecture Elective | 3 |
| Architecture Elective | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 158

[1]Four semesters of Physical Education are required for graduation; two are included in the minimum hours for graduation.
[2]One of the three ARC 400 Architecture Studios may be substituted with another 400 level, 6 credit hour, design studio in another discipline in the school. No more than one studio may be taken in any semester.
[3]Must be selected from specific School of Design approved General Education Lists of Electives.
*Foreign language proficiency at 101/102 levels are required for graduation but do not count toward the degree requirements.

# DEPARTMENT OF DESIGN AND TECHNOLOGY

Brooks Hall

Percy Hooper, *Interim Head*

*Alumni Distinguished Undergraduate Professors:* C. D. Cox, V.M. Foote, Dr. M. Pause; *Professors*: V.M. Foote, FIDSA, H. Khachatoorian, G. Lewis, C. Joyner, M. Pause, S. Brandeis; *Professors Emeriti*: G. L. Bireline, A. Cooke, J. H. Cox, D. R. Stuart, W. Taylor; *Associate Professors*: C. Cox, L. M. Diaz, B. Laffitte, D. Raymond, S. Toplikar; Adjunct Associate *Professors*: A. Merlino, R. Mace, Dr. L. Trachtman, Dr. S.Wainwright; *Assistant Professors:* P. Fitzgerald, P. Hooper.

The Department of Design and Technology awards bachelor degrees in Art and Design and in Industrial Design. The two areas of focus share a common faculty and an integrated curriculum. The pedagogical core of the department aims to reinforce the foundation principles of design theory as applied to two- and three-dimensional design in the study of traditional and advanced technologies, i.e. new media, materials, and production techniques.

Our curriculum addresses broad cultural, ecological, and societal considerations and promotes in our graduates the ability to meet the challenges of technological complexity through collaborative design. We emphasize the application of creative thinking and problem solving to design projects ranging from single to mass-produced artifacts. The areas of application span the range from traditional fine art and industrial design to interactive multimedia. Examples of current areas of study include digital imaging, interactive computer graphics, animation, illustration, sculpture, painting, drawing, fibers, product design, furniture design, ergonomics, exhibition design, textile design, and emerging areas in the media arts.

The Department of Design and Technology firmly believes that there is an essential need for students in a technically-based research university to engage in course work that fosters creative thinking. To meet this need, the department offers courses to non-majors as well as a minor in Design, available to majors in any field in the university. Four specific options are currently available: fibers and surface design, painting, drawing, and sculpture. To complete the minor, 6-9 hours of prerequisite study and 15 hours of specific design courses are required.

## OPPORTUNITIES

Career opportunities for graduates of the Department of Design and Technology span the range from traditional fine art and industrial design to new media systems. Graduates of this department are currently working in fields such as furniture design, multimedia, illustration, recreational product design, toy design, exhibition design, textile design, fashion design, art and design education, photography, film making, special effects, set design, and in all areas of fine arts.

## CURRICULA AND DEGREES

The Department of Design and Technology awards four-year bachelor degrees in Art and Design and in Industrial Design.

## CURRICULUM IN ART AND DESIGN

The Bachelor of Art and Design degree is a broadly based, multidisciplinary undergraduate experience that fully utilizes a diverse faculty and bridges the fine arts and design. Through a well-planned sequence of increasingly complex and in-depth studios and close work with faculty, students are able to construct optimal learning paths that meet their individual needs. This degree program provides a sound, well-rounded visual arts education and focuses on providing students with skills that allow them to perform and succeed in a wide variety of art and design positions after graduation. While the degree is professionally non-specific, students selecting the Bachelor of Art and Design degree may wish to use it as a foundation for later graduate study in a specific art or design discipline.

The goal of the Art and Design curriculum is to provide the structure for the creation of a new model of art and design professionals. These individuals' artistic and practical talents are developed as different expressions of one potentiality. We emphasize proficiency of skills in advanced visualization and interactive media in combination with a strong focus on traditional fine arts and design.

# ART AND DESIGN
## Degree earned: Bachelor of Art and Design

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| DF 101 Design Fundamentals Studio | 6 |
| ENG 111 Comp. and Rhetoric | 3 |
| HA 201 History of Art - Ancient Greece thru Renaiss [1] | 3 |
| Math Elective | 3 |
| Any 100-level PE in Fitness & Wellness [2] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| DF 102 Design Fundamentals Studio | 6 |
| ENG 112 Comp. and Reading | 3 |
| HA 202 History of Art -Renaiss thru 20th Cent. [1] | 3 |
| Math Elective | 3 |
| Physical Education Elective[2] | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Studio [3] | 6 |
| DN 281 Basic Drawing | 3 |
| Basic Science Elective | 3 |
| Basic Science Lab | 1 |
| History/Literature | 3 |
| Physical Education Elective | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| DN 202 Art and Design Studio[4] | 6 |
| Design Elective[5] | 3 |
| History/Literature Elective | 3 |
| Writing, Speech | |
| Foreign Language Elective | 3 |
| Physical Education Elective | 1 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Studio [3] | 6 |
| Design Elective [5] | 3 |
| Basic Science Elective | 3 |
| Basic Science Lab | 1 |
| Humanities/Soc.Sci.Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| DN 302 Art and Design Studio[4] | 6 |
| DN 418 Seminar: Contemporary Issues[6] | 3 |
| Design Elective[5] | 3 |
| Humanities/Soc.Sci.Elective | 3 |
| Natural Science Elective | 3 |
| | 18 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Studio [3] | 6 |
| Design Elective [5] | 3 |
| Humanities/Soc.Sci.Elective | 3 |
| Sci., Technology, & Soc.Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| DN 402 Art and Design Studio[7] | 6 |
| Design Elective[5] | 3 |
| Design Elective[5] | 3 |
| Free Elective | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 127

[1]HA 201 and HA 202 (History of Art 1 & 2) are required for Art & Design degree majors and satisfy 6 hours of requirements for Humanities/Social Sciences.
[2]Required for graduation but is not included in the count of minimum credit hours for graduation.
[3]An Art & Design studio may be substituted with a 400 level, 6 credit hour studio in another discipline in the School of Design. **No more than one studio may be taken in any semester.**
[4]A 6 credit Art and Design studio is required in each Spring semester.
[5]A 3 credit hour course in the Department of Design in the School of Design.
[6]The major paper presented in this course will satisfy the university's General Education Requirement for the junior year.
[7]The major paper presented in this course will satisfy the university's General Education Requirement for the senior year.
-One course in the curriculum must focus on a non-English speaking culture.

-Students must demonstrate 101/102 proficiency in a foreign language to graduate. Credits necessary to meet this requirement will not count toward the degree requirements.
-One course from the School of Design's approved General Education Lists of Electives which require a major paper must be included during the Junior year.

## CURRICULA IN INDUSTRIAL DESIGN

Industrial design is concerned with all human aspects of machine-made products and their relationship to the environment. The industrial designer is responsible for human factors engineering, safety, shape, color, texture, maintenance, and cost. Industrial designers deal with consumer, as well as industrial, products. In order to achieve these ends, designers must be involved in four major design and research areas: human behavior, human-machine relationships, the environment, and the product itself. Furniture Manufacturing, Apparel Technology, and Textile Technology are concentrations offered through collaborations with the Industrial Engineering Furniture Manufacturing and Management Center and the College of Textiles, respectively.

Areas of design investigation in the Bachelor of Industrial Design include furniture, textiles, housewares, appliances, transportation, tools, farm equipment, medical instruments, electronics, human-computer interfaces, and recreational support equipment.

The goal of the Industrial Design curriculum is to teach the design and development of products or systems and their relationship to human beings and the environment. The industrial design curriculum is centered around four major design and research activities: product development and design, product safety, the human/machine relationship, and the ecological impact of a product's life cycle.

Graduates of the Bachelor of Industrial Design program have career opportunities in three general types of practice: corporate design offices in manufacturing companies, independent consulting offices, and governmental agencies.

# INDUSTRIAL DESIGN
## Degree earned: Bachelor of Industrial Design

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| DF 101 Design Fundamentals Studio | 6 |
| ENG 111 Comp. & Rhetoric | 3 |
| Humanities/Soc.Sci.Elective | 3 |
| Math/Statistics/Logic Elective | 3 |
| Any 100-level PE in Fitness & Wellness [2] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| DF 102 Design Fundamentals Studio | 6 |
| ENG 112 Comp. & Reading | 3 |
| Social Science Elective | 3 |
| Math Elective | 3 |
| Physical Education Elective[2] | 1 |
| | 16 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio | 6 |
| ID 255 Cont. Mfg. Processes I | 3 |
| ID 318 Ideation I | 3 |
| GC 120 Foundation of Graphics | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio | 6 |
| ID 256 Cont. Mfg. Processes II | 3 |
| ID 418 Ideation II | 3 |
| Basic Science Elective | 3 |
| Basic Science Lab | 1 |
| Physical Education Elective | 1 |
| | 17 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio | 6 |
| ID 415 Microcomputer Imaging | 3 |
| Basic Science Elective | 3 |
| Basic Science Lab | 1 |
| Social Science Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio[1] | 6 |
| ENG 331 Comm. for Engr.and Technology[3] | 3 |
| ID 492 Special Topics (Human Factors) | 3 |
| History/Literature Elective | 3 |
| Social Science Elective | 3 |
| | 18 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio | 6 |
| Natural Science Elective | 3 |
| Phil., Relig.,.Vis./ Perf. Arts Elective | 3 |
| Humanities/Soc.Sci.Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio[1] | 6 |
| History/Literature Elective | 3 |
| Humanities/Soc.Sci.Elective | 3 |
| Sci., Technology, Soc. Elective | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 127

[1] Students who major in Industrial Design may elect as many as (2) six credit hour studios in another department. Declaration of intent to enroll in studios other than Industrial Design during any semester must be made during the pre-registration period prior to enrollment. **No more than one studio may be taken in any given semester.**

[2]This course is required to graduate but is not included in the count of minimum credit hours for graduation.

[3]This course is recommended to fulfill the requirement for a major paper in the junior year.

* One course which requires a major paper must be completed during the senior year. This will satisfy the General Education Requirement of the university.

*One course in the curriculum must focus on a non-English speaking culture.

*Students must demonstrate 101/102 proficiency in a foreign language to graduate. Credits necessary to meet this requirement will not count toward the degree requirements.

# INDUSTRIAL DESIGN
## Apparel Technology Concentration
## Degree earned: Bachelor of Industrial Design

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| DF 101 Design Fundamentals Studio | 6 | DF 102 Design Fundamentals Studio | 6 |
| ENG 111 Comp. & Rhetoric | 3 | ENG 112 Comp. & Reading | 3 |
| Humanities/Soc.Sci.Elective | 3 | Social Science Elective | 3 |
| Math 131 or 141 | 4 | Math Elective | 3 |
| Any 100-level PE in Fitness & Wellness [2] | 1 | Physical Education Elective[2] | 1 |
| | 17 | | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ID 400 Industrial Design Studio | 6 | ID 400 Industrial Design Studio | 6 |
| ID 318 Ideation I | 3 | ID 256 Cont. Mfg. Processes II | 3 |
| Basic Science Elective | 3 | Textile Elective (List 1 or 2) | 3 |
| Basic Science Lab | 1 | History/ Literature Elective | 3 |
| TMS 211 Intro. to Fiber Science | 3 | Sci., Technology, Soc. Elective | 3 |
| Physical Education Elective | 1 | | 18 |
| | 17 | | |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ID 400 Industrial Design Studio | 6 | ID 400 Industrial Design Studio[1] | 6 |
| ID 415 Microcomputer Imaging | 3 | ENG 331 Comm. for Engr. and Technology[3] | 3 |
| Textile Elective (List 1 or 2) | 3 | Basic Science Elective | 3 |
| Social Science Elective | 1 | Basic Science Lab | 1 |
| Physical Education Elective | 3 | Textile Elective (List 2) | 3 |
| | 16 | | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| DN 470 Fiber and Surface Design Studio | 6 | ID 400 Industrial Design Studio[1] | 6 |
| Phil., Relig..,Vis./Perf. Arts Elective (1) | 3 | Design Elective [4] | 3 |
| Textile Elective (List 2) | 3 | Textile Elective (List 2) | 3 |
| Humanities/Soc. Sci. Elective | 3 | History/ Literature Elective | 3 |
| | 15 | | 15 |

Minimum Hours Required for Graduation ..... 128

[1] Students who major in Industrial Design may elect as many as (2) six credit hour studios in another department. Declaration of intent to enroll in studios other than Industrial Design during any semester must be made during the pre-registration period prior to enrollment. **No more than one studio may be taken in any given semester.**

[2]This course is required to graduate but is not included in the count of minimum credit hours for graduation.

[3]This course is recommended to fulfill the requirement for a major paper in the junior year.

* One course which requires a major paper must be completed during the senior year. This will satisfy the General Education Requirement of the university.

*One course in the curriculum must focus on a non-English speaking culture.

*Students must demonstrate 101/102 proficiency in a foreign language to graduate. Credits necessary to meet this requirement will not count toward the degree requirements.

# INDUSTRIAL DESIGN
## Furniture Manufacturing Concentration
## Degree earned: Bachelor of Industrial Design

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| DF 101 Design Fundamentals Studio | 6 |
| ENG 111 Comp. & Rhetoric | 3 |
| Humanities/Soc.Sci.Elective | 3 |
| Math/Statistics/Logic Elective | 3 |
| Any 100-level PE in Fitness & Wellness [2] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| DF 102 Design Fundamentals Studio | 6 |
| ENG 112 Comp. & Reading | 3 |
| Social Science Elective | 3 |
| Math Elective | 3 |
| Physical Education Elective[2] | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio | 6 |
| ID 255 Cont. Mfg. Processes I | 3 |
| ID 318 Ideation I | 3 |
| GC 120 Foundation of Graphics | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio | 6 |
| ID 418 Ideation II | 3 |
| Basic Science Elective | 3 |
| Basic Science Lab | 3 |
| Sci., Technology, Soc. Elective | 3 |
| | 18 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio | 6 |
| IE 240 Furniture Product Engineering | 3 |
| IE 352 Work Analysis and Design | 3 |
| History/Literature Elective | 3 |
| Social Science Elective | 3 |
| | 18 |

| *Spring Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio[1] | 6 |
| ENG 331 Comm. for Engr. and Technology[3] | 3 |
| IE 241 Furniture Mfg. Processes I | 3 |
| IE 452 Ergonomics | 3 |
| Physical Education Elective | 1 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio | 6 |
| IE 311 Engineering Economic Analysis | 3 |
| Natural Science Elective | 3 |
| Phil., Relig.,Vis./Perf. Arts Elective (1) | 3 |
| Humanities/Soc. Sci.Elective | 3 |
| | 18 |

| *Spring Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio[1] | 6 |
| History/Literature Elective | 3 |
| Basic Science Elective | 3 |
| Basic Science Lab | 3 |
| Sci., Technology, Soc. Elective | 3 |
| | 18 |

Minimum Hours Required for Graduation ..... 127

[1] Students who major in Industrial Design may elect as many as (2) six credit hour studios in another department. Declaration of intent to enroll in studios other than Industrial Design during any semester must be made during the pre-registration period prior to enrollment. **No more than one studio may be taken in any given semester.**

[2]This course is required to graduate but is not included in the count of minimum credit hours for graduation.

[3]This course is recommended to fulfill the requirement for a major paper in the junior year.

• One course which requires a major paper must be completed during the senior year. This will satisfy the General Education Requirement of the university.

•One course in the curriculum must focus on a non-English speaking culture.

•Students must demonstrate 101/102 proficiency in a foreign language to graduate. Credits necessary to meet this requirement will not count toward the degree requirements.

## INDUSTRIAL DESIGN
## Textile Technology Concentration
## Degree earned: Bachelor of Industrial Design

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| DF 101 Design Fundamentals Studio | 6 |
| ENG 111 Comp. & Rhetoric | 3 |
| Humanities/Soc.Sci.Elective | 3 |
| Math 131 or 141 | 4 |
| Any 100-level PE in Fitness & Wellness[2] | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| DF 102 Design Fundamentals Studio | 6 |
| ENG 112 Comp. & Reading | 3 |
| Social Science Elective | 3 |
| Math 231 or 241 | 4 |
| Physical Education Elective[2] | 1 |
| | 17 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio | 6 |
| TMS 211 Intro. to Fiber Science | 3 |
| ID 318 Ideation I | 3 |
| Basic Science Elective | 3 |
| Basic Science Lab | 1 |
| Physical Education Elective | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio | 6 |
| ID 256 Contemporary Mfg.. Processes II | 3 |
| Textile Elective List (List 2) | 3 |
| History/Literature Elective | 3 |
| Sci., Technology, Soc. Elective | 3 |
| | 18 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio | 6 |
| ID 415 Microcomputer Imaging | 3 |
| Textile Elective List (List 1 or 2) | 3 |
| Social Science Elective | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio[1] | 6 |
| ENG 331 Comm. for Engr. and Technology[3] | 3 |
| Textile Elective List (List 2) | 3 |
| Basic Science Elective | 3 |
| Basic Science Lab | 1 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| DN 470 Fiber and Surface Design Studio | 6 |
| Textile Elective List (List 2) | 3 |
| Phil., Relig.,Vis./ Perf. Arts Elective (1) | 3 |
| Humanities/Soc. Sci.Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ID 400 Industrial Design Studio[1] | 6 |
| History/Literature Elective | 3 |
| Design Elective[4] | 3 |
| Textile Elective List (List 2) | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 129

1 Students who major in Industrial Design may elect as many as (2) six credit hour studios in another department. Declaration of intent to enroll in studios other than Industrial Design during any semester must be made during the pre-registration period prior to enrollment. **No more than one studio may be taken in any given semester.**

[2]This course is required to graduate but is not included in the count of minimum credit hours for graduation.

[3]This course is recommended to fulfill the requirement for a major paper in the junior year.

* One course which requires a major paper must be completed during the senior year. This will satisfy the General Education Requirement of the university.

*One course in the curriculum must focus on a non-English speaking culture.

*Students must demonstrate 101/102 proficiency in a foreign language to graduate. Credits necessary to meet this requirement will not count toward the degree requirements.

## MINOR IN DESIGN

Before undertaking a minor in Design, students must complete 9 hours of prerequisite courses that provide an essential foundation in design:

DF 111 Two-dimensional Design for Non-majors
DF 112 Three-dimensional Design for Non-majors
DN 281 Basic Drawing

To complete the minor program, students must take an additional 15 hours of design courses, 12 hours of which must be above the 100 level and at least 6 hours of which must be at the 300 level or above. Four specific options are available in the minor: fibers and surface design, painting, drawing, and sculpture. Courses are chosen from a list of recommended courses in each option in consultation with the student's adviser in the Design and Technology Department. Each student will be

assigned an adviser consistent with his/her option selection. Application forms are obtained from the Design and Technology Department Head.

## DEPARTMENT OF GRAPHIC DESIGN

Brooks Hall

M. Davis, *Head and Director of Graduate Programs*

*Professors*: M. Davis, A. Lowrey, M. Scotford; *Associate Professor*: A. Blauvelt; *Assistant Professors*: K. Bailey, J. Spadaro, S. Townsend

Graphic design is the process of bringing meaningful visual form to communication. Graphic designers translate communication goals through printed, environmental, and electronic presentations of information. Graphic designers use words and images to express messages that inform, persuade, and incite to action individuals and audiences.

Graphic designers are active in all aspects of communication design. For example, they design books, magazines, newspapers, and CD-ROMs for the publishing industry. They also create printed materials such as logotypes, symbols, annual reports, newsletters, business forms, stationery systems, and other related literature for corporations, institutions, businesses, and governmental agencies. Graphic designers create multimedia presentations, web sites, graphical computer interfaces, and motion graphics such as film titling and typographic treatments for video, as well as on-air graphics for television. Graphic designers are employed in a variety of settings, including graphic design offices, advertising agencies, communication businesses, as well as corporations, institutions, or governmental agencies as part of internal communications departments.

The Bachelor of Graphic Design program includes the study of visual, theoretical, historical, and technical aspects of the discipline. The curriculum provides comprehensive experiences in the analysis of communication problems, the development of creative solutions to those problems, and the implementation and evaluation of those solutions. Required support courses in typography explore the role of words and language in graphic communication, while courses in imaging provide students with experiences in a range of photographic, videographic, and motion graphic media. Instruction in computer software programs is fully integrated

in design studios and support courses and is not taught as a separate activity. In their studios, graphic design majors prepare for careers in the field through the execution of demonstration projects of varying complexity and scale. In the last studio, graduating students prepare their portfolios for job searches and demonstrate their expertise in a particular area of practice.

## CURRICULUM IN GRAPHIC DESIGN
## Degree earned: Bachelor of Graphic Design

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| DF 101 Design Fundamentals Studio | 6 |
| ENG 111 Comp. & Rhetoric | 3 |
| Math/Statistics/Logic Elective | 3 |
| History/Literature Elective | 3 |
| Any 100-level PE in Fitness & Wellness[2] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| DF 102 Design Fundamentals Studio | 6 |
| ENG 112 Comp. & Reading | 3 |
| Math Elective | 3 |
| History/Literature Elective | 3 |
| Physical Education Elective[2] | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| GD 201 Graphic Design Studio I | 6 |
| GD 210 Imaging for Graphic Design I | 3 |
| GD 210L Imaging I Lab | 0 |
| GD 217 Type I | 3 |
| Basic Science Elective | 3 |
| Basic Science Lab | 1 |
| Physical Education Elective | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| GD 202 Graphic Design Studio II | 6 |
| GD 310 Imaging for Graphic Design II | 3 |
| GD 310L Imaging II Lab | 0 |
| GD 317 Type II | 3 |
| GD 317L Type II Lab | 0 |
| Basic Sciences Elective | 3 |
| Basic Sciences Lab | 1 |
| Physical Education Elective | 1 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| GD 301 Graphic Design Studio III | 6 |
| GD 410 Imaging for Graphic Design III | 3 |
| GD 410L Imaging iII Lab | 0 |
| GD 342**History of Graphic Design | 3 |
| GD 417 Type III | 3 |
| GD 417L Type III Lab | 0 |
| Social Sciences Elective | 3 |
| | 18 |

| *Spring Semester* | *Credits* |
|---|---|
| GD 400 Advanced Graphic Design Studio[1] | 6 |
| GD 355 Graphic Design Production | 3 |
| GD 355L Graphic Design Production Lab | 0 |
| Design Elective[3] | 3 |
| Social Sciences Elective | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| GD 400 Advanced Graphic Design Studio [1] | 6 |
| Natural Science Elective | 3 |
| Writing, Speech, Foreign Language Elective | 3 |
| Design Elective[3] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| GD 400**Advanced Graphic Design Studio | 6 |
| Math, Natural Science, or Sci., Technology, Soc. Elective | 3 |
| Humanities/Soc.Sci.Elective(1) | 3 |
| Humanities/Soc.Sci.Elective(1) | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 127

[1]Students who major in Graphic Design may elect as many as (2) six credit hour studios in another department. Declaration of intent to enroll in studios other than Graphic Design during any semester must be made during the pre-registration period prior to enrollment. **No more than one studio may be taken in any given semester.**

[2]This course is required to graduate but is not included in the count of minimum credit hours for graduation.

[3]Any course within the Department of Graphic Design or in the School of Design meets this requirement.

*One course in the above curriculum must focus on a non-English speaking culture.

Students must demonstrate 101/102 proficiency in a foreign language to graduate. Credits necessary to meet this requirement will not count toward degree requirements above.

Students who switch majors in the School of Design are advised to check regarding the application of the General Education Requirements toward a degree in the new major. Requirements vary among departments.

** Major papers presented in this course will satisfy the university's General Education Requirements.

# DEPARTMENT OF LANDSCAPE ARCHITECTURE

Brooks Hall

A. R. Rice, *Head*

F. Magallanes, *Director of Graduate Programs*

*Professors*: A. R. Abbate, R. Moore, A. R. Rice, R. R. Wilkinson, D. Wood; *Professors Emeriti*: R. E. Stipe, E. G. Thurlow; *Research Associate Professor*: J. E. Fels; *Research Assistant Professor:* J. Tomlinson; *Assistant Professors*: F. Magallanes, S. Raval; *Associate Members of the Faculty*: W. E. Hooker, J. C. Raulston, M. E. Traer (Horticultural Science), H. Devine (Parks, Recreation and Tourism Management); *Adjunct Associate Professors*: Y. Fazard, C. Flink, C. Roe, W. Swink, J. Wick, L. Zucchino

Landscape architecture is a multi-faceted profession dedicated to the welfare of the environment and living communities of the earth. It is a diverse and growing design profession that combines art, science, engineering, and technology. Landscape Architecture at the School of Design is especially concerned with the stewardship, restoration, and regeneration of the natural and cultural environments in urban, rural, and wilderness settings. The five-year Bachelor of Landscape Architecture degree program provides an educational experience that develops in students the skills necessary to deal creatively and responsibly with the forces-human and natural-that inevitably shape the land.

The Bachelor of Landscape Architecture program stresses the development of the student's intellectual capacity through the medium of a comprehensive design education. The program offers an integrated, broad-based education in the discipline of Landscape Architecture and emphasizes interdisciplinary design work, national and international experience, and ecologically sound community-based design and planning. Students develop the ability to think, visualize, analyze, and synthesize ideas using information and skills from diverse fields of study.

This professional degree program serves individuals who are interested in affecting the environment directly through the profession of landscape architecture or going on to earn a graduate degree in Landscape Architecture or related disciplines. In addition, the department is concerned with fostering an individual's sense of responsibility to society as a steward of the cultural and natural environments. Graduates of the Bachelor of Landscape Architecture program have an understanding of the profession, its role in society, and their own potential role. Graduates offer employers and clients strong intellectual problem solving abilities and the professional skills necessary to evaluate, develop, and communicate solutions to a variety of design and planning problems, including, but not limited to, the design of parks, trail systems, recreational environments, resorts, urban plazas, communities, and conservation plans.

## CURRICULUM IN LANDSCAPE ARCHITECTURE
## Degree earned: Bachelor of Landscape Architecture

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| DF 101 Design Fundamental Studio | 6 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA Math Elective[1] | 3 |
| History and Literature Elective[2] | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| DF 102 Design Fundamental Studio | 6 |
| ENG 112 Comp. & Rhetoric | 3 |
| Math, Statistics/or Logic Elective[3] | 3 |
| Physical Education Elective | 1 |
| Writing and Speaking Elective [14] | 3 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| LAR 400 Landscape Architecture Studio | 6 |
| LAR Advised Elective[4] | 3 |
| LAR 430 Site Planning | 3 |
| History/Literature Elective [2] | 3 |
| Physical Education Elective[5] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| LAR 400 Landscape Architecture Studio | 6 |
| BO 200 Plant Life | 3 |
| ARC 232 Structures & Materials | 3 |
| LAR Advised Elective [4] | 3 |
| | 15 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Required Swing Studio[6] | 6 |
| HS 211 Or. Plant Identification | 3 |
| LAR 221 Intro.to Environ. Behavior | 3 |
| MEA 101 Physical Geology | 3 |
| MEA 110 Geology Lab | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| LAR 400 Landscape Architecture Studio | 6 |
| BO 360 Intro. to Ecology | 3 |
| BO 365 Intro. to Ecology Lab | 1 |
| HS 212 Or. Plant Identification | 3 |
| LAR 457 Construction Materials & Methods | 3 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| LAR 400 Landscape Architecture Studio | 6 |
| LAR 433 Native Plants & Environ. Design | 3 |
| LAR 444 History of Landscape Arch | 3 |
| Humanities Elective[8] | 3 |
| Physical Education Elective[5] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| Advanced Foreign Language[9] | 3 |
| Sci. and Technology Elective[10] | 3 |
| Phil.,Relig.,Vis./Perf. Arts Elective[11] | 3 |
| Humanities/ Soc. Sci. Elective[12] | 3 |
| Humanities Elective[8] | 3 |
| | 15 |

SUMMER SEMESTER

LAR 400 Landscape Architecture Studio[13] ..... 6

FIFTH YEAR

| *Fall Semester* | *Credits* |
|---|---|
| LAR Advised Elective[4] | 3 |
| School of Design Elective[7] | 3 |
| School of Design Elective[7] | 3 |
| Natural Science Elective[15] | 3 |
| Humanities/ Soc. Sci. Elective[12] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| LAR Final Project | 6 |
| Free Elective | 3 |
| Free Elective | 3 |
| | 12 |

Minimum Hours Required for Graduation ..... 157

*Foreign language proficiency at the FL 102 level and one semester at the FL 201 level (or in a second foreign language at the FL 102 level) are required for graduation

*First two PE credits do not count toward minimum credit hours required for graduation.

*One course in the above curriculum must focus on a Non-English Speaking Culture. (See courses marked with asterisk on the university General Education Requirements electives Lists.)

*Students who switch majors within the School of Design are advised to check regarding the application of their General Education Requirements toward a degree in the new major. Requirements vary among Departments.

*No more than one studio may be taken in any given semester.

1 Must be an MA prefix class 114 or higher from the university Mathematical Sciences electives lists.

2 This course must be taken from the university History or Literature electives lists.

3 Must be from the university Mathematical Sciences electives list and if the course has an MA prefix it must be 114 or higher.

4 LAR Advised electives may be filled by any of the following courses: LAR 222, LAR 421, LAR 423, LAR 443, LAR 495, LAR 510, LAR 511, LAR 512, LAR 530, LAR 564, LAR 573, LAR 574 or other approved LAR courses.

5 This course is required for graduation, but is not included in the count of minimum credit hours for graduation.

6 Design, Graphic Design, Industrial Design or Architecture Studio.

7 Any course open to School of Design majors and offered by the School of Design fulfills this requirements.

8 Courses must be taken from the university Psychology, Economics, Politics and Government, Sociology, Anthropology, and Cultural Geography electives lists.

[9] 201 level foreign language or second foreign language at 101 level or higher.
[10] Humanities and Social Science Perspective electives list.
[11] This course must be taken from either the Visual and Performing Arts, Philosophy, or Religion electives lists.
[12] Must be taken from the university Humanities and Social Sciences additional list.
[13] International Off Campus Studio recommended.
[14] Must be taken from the university Advanced Writing/Communication/Speech electives lists.
[15] This course must be taken from either the Natural Sciences (Basic), Natural Sciences (Other), STS (Humanities), or STS (STP) electives lists.

# COLLEGE OF EDUCATION AND PSYCHOLOGY

*Poe Hall*
*NCSU Box 7801*
*Raleigh, NC 27695-7801*

*Phone:* *(919) 515-2231*
*Fax:* *(919) 515-5836*
*Internet E-mail:edu_psy@ncsu.edu*

J.J. Michael, *Dean*

J.R. Kolb, *Associate Dean for Academic Affairs*

E.R. Gerler, *Associate Dean for Research and External Affairs*

C.H. Maidon, *Director of Teacher Education*

G.S. Martin, *Director of Teaching Fellows Program*

A.P. Smith, *Director of Student Services and Coordinator of African-American Students*

The College of Education and Psychology focuses on issues of human development from both psychological and educational perspectives. With emphases upon the preparation of middle grades, high school, and post-secondary teachers, counselors, supervisors, and psychologists, the college seeks students who are dedicated to the improvement of human beings through education, research and service and who are sensitive to the complexity of the teaching/learning processes. The college is composed of the Department of Adult and Community College Education, Counselor Education, Curriculum and Instruction, Mathematics, Science and Technology Education, and Psychology.

Undergraduate degree programs are offered in education general studies, health occupations education, marketing education for teachers, mathematics education, middle grades education, science education, technology education and psychology. In addition to being admitted to a curriculum, all teacher education candidates must meet program requirements for admission to candidacy in teacher education (including a 2.500 or higher overall grade point average after the sophomore year) and for admission to student teaching (including a 2.500 or higher GPA overall and in one's teaching field).

****University Physical Education requirements have been modified. It is recommended that students consult with their adviser on specific curriculum requirements regarding PE.*

Graduates of the undergraduate programs in education receive a Bachelor of Science degree in their field of education and normally qualify for an "A" license to teach in their chosen field. Graduates of the undergraduate program in psychology receive a Bachelor of Arts in Psychology degree.

Five degree programs (health occupations education, technology education, marketing education for teachers, mathematics education and science education) lead to a license to teach in grades 9 - 12.

The College of Education and Psychology also offers degree programs in middle grades teaching with concentrations in language arts, mathematics, science, or social studies. Students seeking this license graduate with two fields of concentration.

Professional education courses are provided for those students enrolled in the College of Humanities and Social Sciences who wish to become teachers of secondary English, French, Spanish, and social studies with a license for grades 9 - 12. Professional education courses are provided for those students enrolled in the College of Agriculture and Life Sciences who wish to become secondary agriculture teachers.

Students enrolled in a natural sciences or mathematical sciences curriculum may double-major in the College of Education and Psychology and also obtain license to teach in grades 6-9 or 9-12.

Most of the college's teacher education programs are in fields of teacher shortage. Graduates have little difficulty finding teaching positions. Because of limited faculty resources, space in some programs is limited.

Most of the education and psychology programs listed in the following pages also offer graduate-level degree programs. In addition, the College of Education and Psychology has graduate programs in:

*Adult Education*
*Counselor Education*
*Curriculum and Instruction*
*Higher Education Administration*
*Middle Grades Education*
*Occupational Education*

*Educational Research and Policy Analysis*
*Elementary Education*
*Reading Education*
*Special Education*
*Training and Development*

*See Graduate Catalog or contact faculty members for information on graduate programs.*

Public schools post-master's licensure programs are available in some curricular areas. All of the bachelor's level and graduate level licensure programs are approved by the North Carolina Board of Education. The college is accredited by the American Psychological Association (APA), the Council for the Accreditation of Counseling and Related Programs (ACREP), and the National Council for the Accreditation of Teacher Education (NCATE).

The College of Education and Psychology is located in Poe Hall. It includes a Learning Resources Library, a Center for Learning Technologies, and an Instructional Computing Facility. The building houses laboratories for technology education, reading, science, psychology, counseling and testing activities.

## SCHOLARSHIPS

The College of Education and Psychology has a scholarship program distinct from the campus Merits Awards Program. Over 20 scholarships are awarded to undergraduates each year. Several scholarships are available to encourage minority students to enroll in the College.

North Carolina State University is one of 14 institutions participating in the N.C. Teaching Fellows Program and has over 140 teaching fellows enrolled. Each fellow receives $5,000 per year for four years in exchange for a commitment to teach for four years in-state.

Other students receive awards through the North Carolina Board of Education's Scholarship Loan Fund for Prospective Teachers and through other sources. High school counselors receive information about, and applications for, all of these scholarships and awards.

## SCHOLARS AND HONORS PROGRAMS

The College of Education and Psychology participates in the University Scholars Program, in which selected students each year participate in weekly activities that broaden and deepen their university experiences. The Psychology Department offers

an optional curriculum for honors students. There is an honors society in psychology, one in education and one in technology education.

### INTERNATIONAL ACTIVITIES

Several faculty members have been involved in overseas projects in China, Ghana, Japan, Peru, Puerto Rico, and Sri Lanka. Some of the foreign language teacher education students spend a year in France or Spain in an exchange program. The enrollment of international students in the several education and psychology programs and elsewhere at NC State also offers on-campus multi-cultural opportunities.

## DEPARTMENT OF ADULT AND COMMUNITY COLLEGE EDUCATION

(See *Graduate Catalog*)

## DEPARTMENT OF AGRICULTURAL AND EXTENSION EDUCATION *(See College of Agriculture and Life Sciences)*

Ricks Hall, Room 13A

J. L. Flowers, *Coordinator of Advising*

Students desiring to become secondary Agriculture teachers in grades 9-12 should seek enrollment in the College of Agriculture and Life Sciences. Refer to the catalog section, Department of Agricultural Extension and Education for curriculum requirements.

# DEPARTMENT OF CURRICULUM AND INSTRUCTION

Poe Hall, Room 602

C.L. Crossland, *Head*

B.J. Fox, *Director of Graduate Education*

C.M. Beal, *Director of Undergraduate Education*

*Alumni Distinguished Undergraduate Professor:* C.A. Pope; *Professors:* C.L. Crossland, D.A. Cullinan, B.J. Fox, P.H. Martorella, B.R. Poulton; *Associate Professors:* J. F. Arnold, P.L. Marshall, T.P. O'Brien, S.S. Osborne, C.A. Pope, R.J. Pritchard, E.J. Sabornie, H. A. Spires, E.S. Vasu; Assistant Professors: C.M. Beal, A.V. Wilson; *Visiting Assistant Professor:* M. Terhaar-Yonkers; *Adjunct Professors:* D.D. Copeland, R. A. Edelfelt; *Adjunct Associate Professor:* H.A. Fingeret; *Adjunct Assistant Professors:* S. B. Buckner, C.J. Messina, W.R. Parker; *Professor Emeritus:* B.M. Parramore; *Associate Professor Emeritus:* L. Thies-Sprinthall.

The Department of Curriculum and Instruction prepares undergraduate students to become teachers of middle grades language arts and social studies, secondary marketing education, and to become leaders in health occupations. The Department currently includes a diversity of highly qualified students. All programs emphasize scholarship an individually designed study, and include cross-disciplinary work and field-based experiences.

## CURRICULA IN HEALTH OCCUPATIONS TEACHER EDUCATION

Poe Hall, Room 402

The Health Occupations Education program goal is to provide learning experiences that permit students to develop specific competencies associated with effective teaching and leadership roles as they relate to health care. The Bachelor of Science program prepares qualified individuals for various positions in hospitals, secondary schools, community colleges, and other post-secondary institutions. Some graduates seek teaching positions in their own health fields; others choose to teach high school health occupations education. Some work in health care delivery in area hospitals and health agencies, while others work in a variety of capacities in business, industry, and government. Thirty hours of equivalency credit is granted by validation of a current credential in a health occupations specialty recognized by the American Dental Association, American Medical Association-Committee on Allied Health Education and Accreditation, or National League for Nursing.

# CURRICULUM IN HEALTH OCCUPATIONS EDUCATION
## Licensure Option
## Degree earned: B.S. in Health Occupations Education

FRESHMAN YEAR

All health occupations students transfer into the curriculum. Generally most have 30 semester hours or more of transfer credit.

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 111 Comp. & Rhetoric | 3 |
| Math Elective[1] | 3 |
| Science Elective[2] | 4 |
| Writing/Speaking Elective[3] | 3 |
| EOE 101 Intro. to Occ. Education | 1 |
| ECI 451 Improving Reading Sec. Schools | 2 |
| | 16 |

| *Spring* | *Credits* |
|---|---|
| ENG 112 Comp. & Reading | 3 |
| Science Elective[2] | 4 |
| History/Literature[4] | 3 |
| EOE 207 Intro. to Teaching Occ. Education | 3 |
| Math Elective[1] | 3 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Science Elective[2] | 3 |
| Math/Science Elective[5] | 3 |
| PSY 304 Educational Psychology | 3 |
| History/Literature Elective[4] | 3 |
| EOE 332 Health Promotion & Disease Prevention | 3 |
| ED 310 Teaching Adolescents | 1 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| EOE 333 Health Care Delivery | 3 |
| Humanities/Soc. Sci. Elective[6] | 3 |
| EOE 336 Strategies of Teaching Health Occupations | 3 |
| ELP 334 School and Society | 3 |
| EOE 335 Planning Classroom & Clinic | 3 |
| PEH Physical Education Elective | 2 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Humanities/Soc.Sci. Elective[7] | 3 |
| EOE 438 Medical Law & Ethics | 3 |
| Free Elective | 3 |
| PSY 376 Developmental Psychology or | |
| PSY 476 Psychology of Adolescent Dev. | 3 |
| EOE 436 Evaluative Skills of Teaching a Hlth Occ. | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| EOE 437 Health Occ. Teach Practicum | 8 |
| Humanities/Soc.Sci. Elective[8] | 3 |
| Humanities/Soc.Sci. Elective[9] | 3 |
| Physical Education Elective | 1 |
| | 15 |

Minimum Hours Required for Graduation ..... 124[10,11]

# CURRICULUM IN HEALTH OCCUPATIONS EDUCATION
## Non-Licensure Option
## Degree earned: B.S. in Health Occupations

FRESHMAN YEAR

All health occupations students transfer into the curriculum. Generally most have 30 semester hours or more of transfer credit.

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 111 Comp. & Rhetoric | 3 |
| Math Elective[1] | 3 |
| Science Elective[2] | 4 |
| Writing/Speaking Elective[3] | 3 |
| Free Elective. | 3 |
| | 16 |

| *Spring* | *Credits* |
|---|---|
| ENG 112 Comp. & Reading | 3 |
| Science Elective[2] | 4 |
| History/Literature[4] | 3 |
| Free Elective | 3 |
| Math Elective[1] | 3 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Science Elective[2] | 3 |
| Math/Sci Elective[5] | 3 |
| PSY 304 Educational Psychology | 3 |
| History/Literature Elective[4] | 3 |
| EOE 332 Health Promotion & Disease Prevention | 3 |
| Any 100-level PE in Fitness & Wellness[11] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| EOE 333 Health Care Delivery | 3 |
| Humanities/Soc.Sci. Elective[6] | 3 |
| Humanities/Soc.Sci. Elective[7] | 3 |
| EOE 336 Strategies of Teaching Health Occupations | 3 |
| EOE 335 Planning Classroom & Clinic | 3 |
| PEH Physical Fitness Elective | 2 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| EOE 433 Health Occupations Specialty Practicum | 3 |
| EOE 438 Medical Law & Ethics | 3 |
| Free Electives | 6 |
| EOE 436 Evaluative Skills of Teaching a Hlth Occ. | 3 |
| Physical Fitness Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| EOE 437 Health Occ. Teach Practicum | 3 |
| Humanities/Soc.Sci. Elective[8] | 3 |
| Humanities/Soc.Sci. Elective[9] | 3 |
| EOE 434 Clinical Supervision in HOE | 3 |
| Free Elective | 3 |
| Physical Fitness Elective | 1 |
| | 16 |

Minimum Hours Required for Graduation ..... 124[10,11]

[1]Two courses (six semester hours) selected from mathematics, statistics, and logic; one course (3 semester hours) must be a mathematics course.
[2]Three courses (11 semester hours) from natural sciences; two selected from biology, chemistry, earth sciences, and physics; one selected from natural sciences other than those previously listed. Two of these courses must have a Lab.
[3]One course (3 semester hours) from advanced writing elective, communication/speech elective, or foreign language elective lists.
[4]Two courses (6 semester hours) from History elective and/or literature elective.
[5]One course (3 semester hours) in mathematical sciences or natural sciences electives.
[6]One course (3 semester hours) from one of the following elective areas: philosophy, religion, visual and performing arts. The course must focus on non-English speaking culture.
[7]One course (3 semester hours) from one of the following elective areas: economics, politics and government, sociology, anthropology, or cultural geography.

[1]One course (3 semester hours) from the science, technology, and society (Humanities and Social Sciences perspectives list).
[2]One course (3 semester hours) from the electives in # seven above or the Humanities and Social Sciences (additional) list.
[10]Must have demonstrated foreign language proficiency at the FL-102 level.
[11] Two physical education credits do not count towards graduation.

# CURRICULUM IN MARKETING EDUCATION

Poe Hall, Room 402

T. O'Brien, *Coordinator*

The Marketing Education curriculum is specifically designed to prepare teachers for Marketing Education programs in secondary schools. In addition, it provides the necessary pedagogical and technical preparation needed by marketing instructors in community and technical colleges, as well as for selected training and development roles in business and industry. The combination of a broad general and professional education, business and marketing courses, and supervised work experience in marketing jobs provides a unique preparation for educators in a rapidly expanding occupational area.

## CURRICULUM IN MARKETING EDUCATION
## Degree earned: B.S. in Marketing Education

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| EOE 101 Intro. to Occ. Education. | 1 |
| ENG 111 Comp. and Rhetoric | 3 |
| Mathematical Sciences Elective[1] | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| Natural Science Elective[2] | 4 |
| Sci./Technology/Soc. Elective[3] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 200 Intro. to Computers | 3 |
| ENG 112 Comp. and Reading | 3 |
| History Elective[4] | 3 |
| Speech Elective | 3 |
| Physical Education Elective | 1 |
| Natural Science Elective[2] | 3 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| EC 201 Economics I | 3 |
| EOE 207 Int. to Teach. Occ. Education.** | 3 |
| Literature Elective[4] | 3 |
| PSY 304 Educational Psychology** | 3 |
| Physical Education Elective | 1 |
| Free Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| EC 202 Economics II | 3 |
| BUS 360 Marketing Methods | 3 |
| Natural Science Elective[2] | 4 |
| SOC Elective[4] | 3 |
| Political Science Elective[4] | 3 |
| Physical Education Elective [5] | 1 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BUS(ST) 350 Economics & Bus. Statistics | 3 |
| BUS 467 Adv. and Sales Promotion* | 3 |
| ELP 344 School and Society** | 3 |
| PSY 376 Human Growth and Dev., or | |
| PSY 476 Psy. of Adolescence | 3 |
| BUS 466 Sales Mgmt.* | 3 |
| ED 310 Tutoring Adolescents | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ACC 280 Managerial Accounting | 3 |
| BUS 307 Business Law 1 | 3 |
| BUS 330 Human Res. Mgmt. | 3 |
| EOE 307 Field Work in Occ. Education. | 2 |
| PHI 314 Issues in Business Ethics | 3 |
| BUS 468 Marketing Mgmt. and Plan.* | 3 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BUS 462 Marketing Research | 3 |
| EOE 444 Adm. of Marketing Education. | 3 |
| EOE 446 Curr. and Methods of MKE** | 3 |
| ECI 451 Reading in the Sec. School | 2 |
| Economics & Bus. Elec.(300 or 400 level) | 3 |
| Free Elective | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| EOE 447 Student Teaching in MKE | 8 |
| EOE 494 Senior Seminar in MKE | 3 |
| Free Elective | 3 |
| | 14 |

Minimum Hours Required for Graduation ..... 126***

* Taken at Meredith College through the Cooperating Raleigh Colleges Agreement
** Prerequisites to the Professional Semester
*** Must also have demonstrated foreign language proficiency at the FL_ 102 level

**CURRICULUM NOTES**

[1] Must be a mathematics course.
[2] Two from natural sciences elective list (biology, chemistry, earth sciences, and physics) and one from natural sciences elective list (other than biology, chemistry, earth sciences, and physics); two of the three courses must have a lab.
[3] Course must be taken from the Sci./technology/and society (science and technology perspective) electives list.
[4] One must focus on a non-English speaking culture.

## CURRICULA IN MIDDLE GRADES EDUCATION
## Degree earned: B.S. in Middle Grades Education

## LANGUAGE ARTS/SOCIAL STUDIES CONCENTRATION

C.M. Beal, *Coordinator*

FRESHMAN YEAR

| *Fall Semester* | *Credit* |
|---|---|
| ECI 102 Orient to Mid Grades Education. | 0 |
| ENG 111 Comp. & Rhetoric | 3 |
| HI 205 Western Civ. Since 1400 or | |
| HI 233 World in 20th Century | 3 |
| Mathematics Elective[1] | 3 |
| Natural Science Elective[3] | 4 |
| Communication Elective[4] | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 17 |

| *Spring Semester* | *Credit* |
|---|---|
| ENG 112 Comp. & Reading | 3 |
| HI 251 Early American History or | |
| HI 252 Modern American History | 3 |
| Math, Logic, or Stat Elective[2] | 3 |
| Natural Science Elective[3] | 4 |
| Political Science Elective[5] | 3 |
| Physical Education Elective | 1 |
| | 17 |

SOPHOMORE YEAR

| *Fall Semester* | *Credit* |
|---|---|
| ENG 262 English Literature II | 3 |
| HI 275 Intro. to History of S & E Africa or | |
| HI 276 Intro. to History of W Africa or | 3 |
| SOC 305 Race & Ethnic Relations | 3 |
| American Literature Elective * | 3 |
| Natural Science Elective[3] | 3 |
| Physical Education Elective (Activity) | 1[b] |
| | 16 |

| *Spring Semester* | *Credit* |
|---|---|
| GEO 200 Prin. of Geography | 3 |
| ECI 205 Intro. Teach Humanities& Soc Sci. | 3 |
| PSY 304 Educational Psychology | 3 |
| American Literature Elective* | 3 |
| Anthropology Elective[2] | 3 |
| Physical Education Elective (Activity) | 1[b] |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credit* |
|---|---|
| ECI 305 Prin. Teach Diverse Pop | 3 |
| ECI 415 Arts & Adolescence | 2 |
| ELP 344 School and Society | 3 |
| PSY 476 Psych of Adolescent Dev | 3 |
| PEH 280 Emer Medical Care & First Aid or | |
| PEH 285 Personal Health | 2 |
| Literature Elective[2] | 3 |
| | 16 |

| *Spring Semester* | *Credit* |
|---|---|
| ECI 306 Middle Grades Reading | 3 |
| ECI 307 Writing Across Curriculum | 3 |
| ECI 309 Teaching in Middle Grades** | 3 |
| ED 310 Tutoring Adolescents** | 1 |
| Sci./Technology/Soc. Elective[2] | 3 |
| Economics Elective[6] | 3 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credit* |
|---|---|
| ECI(ENG) 405 Lit for Adolescents | 3 |
| ECI 430 Meth & Materials in Mid Gr LA | 4 |
| ECI 435 Meth & Materials in Mid Gr SS | 4 |
| ENG 328 Language and Writing or | |
| ENG 422 Writ Th & Writ Process | 3 |
| HI 364 North Carolina History[7] | 3 |
| | 17 |

| *Spring Semester* | *Credit* |
|---|---|
| ECI 416 Teach Exceptional Child | 3 |
| ECI 454 Student Teach in Language Arts | 5 |
| ECI 464 Student Teach Soc Stud | 5 |
| | 13 |

Minimum Hours Required for Graduation ..... 126[a]

[a]Students must demonstrate foreign language proficiency at the FL _ 102 level.
[b]Two PE credits do not count toward minimum credit hours required for graduation
[1]MA 103, 105, 111, 114, 121, 131, 214 MA 101 is excluded.
[2]Any course from the appropriate university approved list of electives.
[3]BIO 125, BO 200, CH 100, CH 101, MEA 101 or PY 131 and one additional course from the university approved natural science (basic or other) lists.
[4]COM 112, 202, 212, 312, 322
[5]PS 201, 202, 231, 236
[6]EC 201, ARE 201 or ARE 210
[7] For prospective NC certification only; others take HI elective at 300-400 level from the approved Humanities and Social Science list.
*ENG 248, 265, 266, 283, 305, 349, 369, 448, 468.

## CURRICULUM IN MIDDLE GRADES EDUCATION MATHEMATICS/SCIENCE CONCENTRATION
**Degree earned: B.S. in Middle Grades Education**

K.S. Norwood, *Coordinator*

Curriculum requirements for the mathematics/science concentration can be located in the Department of Mathematics, Science and Technology Education section of this catalog.

# CURRICULA IN EDUCATION, GENERAL STUDIES
Poe Hall, Room 608

P.A. Hessling, *Coordinator of Advising*

The Education, General Studies program has two areas of emphasis. Emphasis A serves those students who are interested in those fields of education that do not require formal certification, such as juvenile homes, day care, and other public and private agencies. Emphasis B serves those students previously enrolled in teacher education programs at North Carolina State University, but whose career goals have changed.

## EDUCATION: GENERAL STUDIES
**Emphasis A**: Students preparing for non-certified positions in education
**Degree earned: B.S. in Education, General Studies**

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 111 Comp. & Rhetoric | 3 |
| Mathematical Sciences | 3 |
| PSY 200 Intro. to Psy | 3 |
| FL 101 Foreign Language | 3 |
| Any 100 - level PE in Fitness & Wellness. | 1 |
| | 13 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 112 Comp. & Reading | 3 |
| Mathematical Sciences | 3 |
| SOC 202 Prin. of Sociology | 3 |
| Free elective | 3 |
| Humanities/Soc. Sci. Elective | 3 |
| Physical Education Elective | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Natural Science (Basic) | 4 |
| PHI 205 Problems & Types | 3 |
| Humanities/Soc. Sci. Elective | 3 |
| History or Lit. Elective | 3 |
| Free Elective | 3 |
| Physical Education Elective. | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| Natural Science (Basic) | 4 |
| Comm/Speech Elective | 3 |
| Visual & Perf. Arts Elective | 3 |
| History or Lit. Elective | 3 |
| Education: Introductory | 3 |
| Physical Education Elective | 1 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Natural Science (Other) | 3 |
| ELP 344 School & Society | 3 |
| PSY 304 Educational Psy | 3 |
| Education or Psy Elective | 3 |
| SOC 305 Racial & Ethnic Rel | 3 |
| Advanced Writing Elective | 3 |
| | 18 |

| *Spring Semester* | *Credits* |
|---|---|
| Sci./Technology/Soc. Elective | 3 |
| Education or Psy Elective | 3 |
| PSY 376 Developmental Psy | 3 |
| SOC 311 Community Relations | 3 |
| PSY 310 Learning & Motivation or | |
| PSY 320 Cognitive Processes | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Free Elective | 3 |
| ELP 496 Special Topic (EGS) | 3 |
| Education or Psy Electives | 9 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ELP 201 Alt Educational Agencies | 3 |
| SOC 418 Sociology of Education | 3 |
| Education or Psy Electives | 6 |
| Comm/Speech Elective | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 124

## EDUCATION: GENERAL STUDIES
## Emphasis B: Students formerly in teacher education programs
## Degree earned: B.S. in Education, General Studies

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ENG 111 Comp. & Rhetoric | 3 | ENG 112 Comp. & Reading | 3 |
| Mathematical Sciences | 3 | Mathematical Sciences | 3 |
| PSY 200 Intro. to Psy | 3 | SOC 202 Prin. of Sociology | 3 |
| FL 101 Foreign Language | 3 | Free elective | 3 |
| Any 100-level PE in Fitness & Wellness | 1 | Humanities/Soc. Sci. Elective | 3 |
| | 13 | Physical Education Elective | 1 |
| | | | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| Natural Science (Basic) | 4 | Natural Science (Basic) | 4 |
| PHI 205 Problems & Types | 3 | Comm/Speech Elective | 3 |
| Humanities/Soc. Sci. Elective | 3 | Vis/ Perf. Arts Elective | 3 |
| History or Lit. Elective | 3 | History or Lit. Elective | 3 |
| Free Elective | 3 | Education: Introductory | 3 |
| Physical Education Elective. | 1 | Physical Education Elective | 1 |
| | 17 | | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| Natural Science (Other) | 3 | Sci./Technology/Soc. Elective | 3 |
| ELP 344 School & Society | 3 | Education Elective | 3 |
| PSY 304 Educational Psy. | 3 | PSY 376 Developmental Psy. | 3 |
| Advanced Writing Elective | 3 | Supporting Elective | 3 |
| Teaching Field | 3 | Teaching Field | 6 |
| | 15 | | 18 |

SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| Free Elective | 3 | ELP 201 Alt Educational Agencies | 3 |
| Supporting Elective | 3 | Supporting Elective | 3 |
| Teaching Field | 9 | Teaching Field | 9 |
| | 15 | | 15 |

Minimum Hours Required for Graduation ..... 124

## ENGLISH TEACHER EDUCATION

L. H. MacKethan, *Coordinator of Advising*

Students desiring to become secondary English teachers in grades 9-12 will be enrolled in the College of Humanities and Social Sciences. In that College's section of this Catalog, curriculum requirements for the teacher education option can be found under the Department of English. Students desiring to become language arts teachers in grades 6-9 will be enrolled in the College of Education and Psychology. For details, consult the Middle Grades Education description.

## FRENCH TEACHER EDUCATION

D. Adler, *Coordinator of Advising*

Students desiring to become teachers of French will be enrolled in the College of Humanities and Social Sciences. In that College's section of this Catalog, curriculum requirements for the teacher education option in French can be found under Foreign Languages and Literatures.

## DEPARTMENT OF MATHEMATICS, SCIENCE AND TECHNOLOGY EDUCATION

Poe Hall, Room 326

J.H. Wheatley, *Interim Department Head*

W.M. Waters, *Director of Graduate Programs for Mathematics Education*

D.A. Adams, *Director of Graduate Programs for Occupational Education*

S.L. Westbrook, *Director of Graduate Programs for Science Education*

R.E. Wenig, *Director of Graduate Programs for Technology Education*

*Alumni Distinguished Undergraduate Professors:* J. R. Kolb, J.C. Park, L.W. Watson; *Professors:* D.A. Adams, L.M. Clark, J.R. Kolb; *Professors Emeriti:* N.D. Anderson, H.E.Speece; *Associate Professors:* S.B. Berenson, V.W. DeLuca, W.J. Haynie III, J.C. Park, R.E. Peterson, L.V. Stiff, W.J. Vanderwall, W.M. Waters Jr., L.W. Watson, R.E. Wenig, J.H. Wheatley; *Associate Professor Emeritus:* H.A. Shannon; *Research Associate Professor*: H.S. Stubbs; *Assistant Professors:* G.S. Carter, K.S. Norwood, S.L. Westbrook; *Assistant Professor Emeritus*: J.L. Crow; *Visiting Assistant Professor:* D. Vidakovic; *Instructors:* T.J. Branoff, A.Y. Scales; *Lecturers:* A. Clark, J.F. Freeman, E.N. Wiebe; *Lecturers Emeriti:* G.K. Hillard, B.D. Webb; *Adjunct Assistant Professors:* R.R. Jones, J.A. Lutz, C.M. Meek, W.E. Spooner, L.M. Stroud.

The Department of Mathematics, Science and Technology Education prepares undergraduate students to become teachers of mathematics, science and technology. The department traditionally prepares competent professionals who have strong subject-matter backgrounds and pedagogical skills. Departmental majors may seek licensure for teaching high school grades 9-12 or middle school grades 6-9. Students in the high school curriculum in mathematics education or science education take approximately 45 percent of their program in science and mathematics and may complete a double major, receiving a second degree in mathematics or one of the sciences. Students in Technology Education may be licensed as teachers of technology programs in middle grades and high schools. All pre-service teaching programs provide a broad background; an in-depth study in mathematics, technology or an area of science; and the development of professional competencies.

In addition, the technology education curriculum provides a non-teaching option with a general technical background for a variety of employment opportunities in business and industry. A minor in Technology Education is available.

The department also offers a minor in Graphic Communications in which the student develops proficiency in applying graphic techniques in both career and leisure activities.

## SCHOLARSHIPS AND AWARDS

The Speece Scholarship is awarded annually to as many as three outstanding juniors or seniors in either mathematics education or science education. The department sponsors two undergraduate organizations: the Mathematics and Science Education Club and the Technology Education Collegiate Association. Annual awards are given to the outstanding seniors in Mathematics Education (9-12), Science Education (9-12), Technology Education (6-12), and Middle Grades Education (6-9) in mathematics and in science. Technology education students are eligible for the Epsilon Pi Tau Leadership Award.

## CURRICULA IN MATHEMATICS EDUCATION
## Degree Earned: B.S. in Mathematics Education

Poe Hall, Room 326

L.V. Stiff, *Coordinator*

## CURRICULUM IN MATHEMATICS EDUCATION
## MED: Mathematics Education Grades 9-12 licensure

### REQUIREMENTS

| General Studies (54-57 semester hours) | Credits |
|---|---|
| *English and Communication Courses* | |
| ENG 111 Comp. and Rhetoric | 3 |
| ENG 112 Comp. and Reading | 3 |
| Communication Elective (COM 110, COM 112, or COM 211) | 3 |
| | 9 |
| *Humanities and Social Sciences Courses* | |
| History Elective[1,2] | 3 |
| Humanities Electives/Soc.Sci. Elective[1,2] | 3 |
| Literature Elective[1,2] | 3 |
| Social Electives[1,2,5] | 3 |
| Phil.-Relig.- Vis/Perf.Arts Electives[1,2] | 3 |
| Psy 304 Educational Psychology | 3 |
| Sci./Technology/Soc. Elective[4] | 3 |
| Multicultural Elective[2,5] | 3 |
| | 24 |
| *Science Courses* | |
| Physical Science[3] | 8 |
| Natural Science Elective | 3-4 |
| | 11-12 |
| *Physical Education and Free Electives* | |
| Any 100-level PE in Fitness & Wellness | 1 |
| Physical Education Electives[5] | 3 |
| Free Electives | 6-9 |
| | 10-13 |

| Teaching Major(43-46 semester hours) | |
|---|---|
| *Core Courses (required of all students)* | |
| E 115 Intro. to Computing Environment | 1 |
| CSC 112 or 114 Intro. to Computing | 3 |
| MA 141 Analytic Geom. and Calculus I | 4 |
| MA 241 Analytic Geom. and Calculus II | 4 |
| MA 242 Analytic Geom. and Calculus III | 4 |
| MA 403 Intro. to Modern Algebra | 3 |
| MA 408 Foundation of Euclidean Geom. | 3 |
| LOG 201 Logic | 3 |
| ST 101 Statistics by Example | 3 |
| | 28 |
| *Specializations (choose one of these)* | |
| *Mathematics* | |
| MA 225 Structure of Real Number System | 3 |

MA 341 Applied Diff. Equations I ..... 3
MA 405 Intro. to Linear Algebra and Matrices ..... 3
MA 433 History of Mathematics ..... 3
Math Elective[8] ..... 3
15

*Computer Science*

MA 225 Structure of Real Number System or
CSC 222 Applied Discrete Mathematics ..... 3
CSC 210 Programming Concepts ..... 3
CSC 201 Basic Computer Organization and Assembly Language ..... 3
CSC 311 Data Structures ..... 3
MA 305 Elementary Linear Algebra or
MA 405 Intro. to Linear Algebra and Matrices ..... 3
CSC Elective ..... 3
18

*Statistics*

MA 225 Foundations of Advanced Mathematics ..... 3
MA 305 Elementary Linear Algebra *or*
MA 405 Intro. to Linear Algebra and Matrices ..... 3
ST 301 Statistical Methods I ..... 3
ST 302 Statistical Methods II ..... 3
ST 421 Intro. to Mathematical Statistics I ..... 3
ST 422 Intro. to Mathematical Statistics II ..... 3
18

**Professional Studies (required of all students)(30 semester hours)**

ECI 416 Teaching Exceptional Children in Mainstreamed Classrms ..... 3
ED 310 Tutoring Adolescents ..... 1
ELP 344 School and Society ..... 3
EMS 101 Orientation to Mathematics and Science Education ..... 0
EMS 203 Intro. to Teaching Mathematics and Science ..... 3
EMS 470 Methods and Materials with Microcomputers[9] ..... 3
EMS 471 Student Teaching in Mathematics[9] ..... 8
EMS 472 Teaching Mathematics Topics in Senior High[9] ..... 3
EMS 480 Teaching Mathematics with Microcomputers ..... 3
PSY 476 Psychology of Adolescent Dev. ..... 3
30

Minimum Hours Required for Graduation ..... 128

[1] Must be chosen from the university's official lists for humanities and social sciences
[2] At least one of the indicated course must be chosen from the university's non-English speaking cultures' list
[3] Social science elective can not be a Psychology course
[4] Must be chosen from the University's Sci./Technology/Soc. Elective list (humanities and social sciences perspective)
[5] Chosen from ANT 252, COM/ANT/HSS 392, SOC 305, or ECI 305
[6] Must choose one of the following two-course sequences: CH 101/121 CH 107/127, or PY 205-208 or PY 211-212
[7] Two P.E. credits do not count toward minimum for graduation
[8] Must be a course at 200-level or above or MA 105
[9] These courses are taken together as a block in the fall semester. Student teaching is full-time for ten weeks.

# CURRICULUM IN MATHEMATICS EDUCATION:
# MSM: Middle School Mathematics (With Science) Grades 6-9 Licensure

K.S. Norwood, *Coordinator*

## REQUIREMENTS

**General Studies (56-57 semester hours)** — **Credits**

*English and Communication Courses*

| | |
|---|---|
| ENG 111 Comp. and Rhetoric | 3 |
| ENG 112 Comp. and Reading | 3 |
| COM 110 or COM 112 or COM 211 | 3 |
| | 9 |

*Humanities and Social Sciences Course*

| | |
|---|---|
| History Elective[1,2] | 3 |
| Humanities/Soc.Sci. Electives[1,2] | 6 |
| Literature Elective[1,2] | 3 |
| Social Science Elective[1,2,3] | 3 |
| Phil., Relig., Vis/Perf.Arts Elective[1,2] | 3 |
| Psy 304 Educational Psychology | 3 |
| Sci./Technology/Soc. Elective[4] | 3 |
| Multicultural Elective[2,5] | 3 |
| | 27 |

*Science Courses*

| | |
|---|---|
| PY 131 Conceptual Physics | 4 |
| BIO 125 General Biology | 4 |
| MEA 101/110 Physical Geology and Lab. | 3-4 |
| | 11-12 |

*Physical Education and Free Electives*

| | |
|---|---|
| Any 100-level PE in Fitness & Wellness | 1 |
| Physical Education Electives[8] | 3 |
| PEH 280 Emergency Medical Care and First Aid or PEH 285 Personal Health | 2 |
| Free Electives | 4 |
| | 10 |

**Teaching Major (36 semester hours)**

| | |
|---|---|
| CH 100 or CH 101/121 General Chemistry | 4 |
| CSC 200 Intro. to Computers and Their Uses | 3 |
| MA 105 Mathematics of Finance | 3 |
| MA 114 Intro. to Finite Mathematics with Applications | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| MA 225 Foundations of Advanced Mathematics | 3 |
| MA 308 College Geom. | 3 |
| MA 433 History of Mathematics | 3 |
| MEA 130 Weather or PY 123 Astronomy | 3 |
| Statistics Elective | 3 |
| | 36 |

**Professional Studies (39 semester hours)**

| | |
|---|---|
| ECI 306 Middle Years Reading | 3 |
| ECI 309 Teaching in the Middle Years | 3 |
| ECI 416 Teaching Exceptional Students in Mainstreamed Classroom | 3 |
| ED 310 Tutoring Adolescents | 3 |
| ELP 344 School and Society | 3 |
| EMS 101 Orientation to Mathematics and Science Education | 0 |
| EMS 203 Intro. to Teaching Mathematics and Science | 3 |
| EMS 470 Methods & Materials for Teaching Mathematics[9] | 3 |

| | |
|---|---|
| EMS 471 Student Teaching in Mathematics[9] | 8 |
| EMS 474 Teaching Mathematics Topics in the Middle Grades[9] | 3 |
| EMS 480 Teaching Mathematics with Microcomputers | 3 |
| PSY 476 Psychology of Adolescent Dev. | 3 |
| | 36 |
| Minimum Hours Required for Graduation | 128 |

[1] Must be chosen from the university's list of approved humanities and social sciences
[2] At least one of the indicated courses must be chosen from the non-English speaking cultures list
[3] Social science elective may not be a psychology course
[4] Must be chosen from the Sci./Technology/Soc. Elective list (humanities and social sciences perspective)
[5] Chosen from ANT 252, COM/ANT/HSS 392, SOC 305, ECI 305
[6] Chosen from basic natural sciences elective list. At least two of the three science courses must have a lab
[7] Chosen from additional natural sciences elective list
[8] Two credits of PE do not count toward the minimum for graduation
[9] Taken together as a block in the fall only. Student teaching is full-time for ten weeks.

## CURRICULA IN MIDDLE GRADES EDUCATION
## Degree Earned: B.S. in Middle Grades Education
## Curriculum in Middle Grades, Language Arts/Social Studies

C.M. Beal, *Coordinator*

Curriculum requirements for Language Arts/Social Studies can be found in this catalog under the Department of Curriculum and Instruction.

## CURRICULUM IN MIDDLE GRADES EDUCATION
## MATHEMATICS/SCIENCE CONCENTRATION
## MSD: Middle School Dual Mathematics and Science Concentration
## Grades 6-9 licensure
## Degree earned: B.S. in Middle Grades Education

K.S. Norwood, *Coordinator*

### REQUIREMENTS

| **General Studies (40 semester hours)** | *Credits* |
|---|---|
| *English and Communication Courses* | |
| ENG 111 Comp. and Rhetoric | 3 |
| ENG 112 Comp. and Reading | 3 |
| Communication Electives (COM 110 or COM 112 or COM 211 | 3 |
| | 9 |
| *Humanities and Social Sciences Courses* | |
| History Elective[1,2] | 3 |
| Humanities/Soc.Sci. Elective[1,2] | 3 |
| Literature Elective[1,2] | 3 |
| Social Science Elective[1,2,3] | 3 |
| Phil/Rel/Fine Arts Elective[1,2] | 3 |

PSY 304 Educational Psychology ..... 3
Sci./Technology/Soc. Elective[4] ..... 3
Multicultural Elective[2] (ANT 252, ECI 305, COM/ANT/HSS 392, or SOC 305) ..... 3
24

*Physical Education and Free Electives*

Any 100-level PE in Fitness & Wellness ..... 1
Physical Education Elective ..... 3
Free Electives ..... 3
PEH 280 Emergency Medical Care and First Aid *or*
PEH 285 Personal Health ..... 2
PEH Teaching Major (52-54 semester hours)
BIO 125 General Biology and Lab ..... 4
CH 101/121 General Chemistry I and Lab ..... 4
CH 107/127 Prin. of Chemistry and Lab ..... 4
CSC 200 Intro. to Computers & Their Uses ..... 3
Biology Elective ..... 3
MA 114 Intro. to Finite Mathematics & Applications ..... 3
MA 131 Analytic Geom. & Calculus A *and*
MA 231 Analytic Geom. & Calculus B *or*
MA 141 Analytic Geom. & Calculus I *and*
MA 241 Analytic Geom. & Calculus II ..... 7-8
MA 225 Foundations of Advanced Mathematics ..... 3
MA 308 College Geom. ..... 3
MA Elective ..... 3
MEA 101/110 Physical Geology and Lab ..... 4
Statistics Elective (ST 101 ,311, 361, or 371) ..... 3
PY 211 College Physics I ..... 4
PY 212 College Physics II ..... 4
52-54

Professional Studies (36 semester hours)

ECI 306 Middle Years Reading ..... 3
ECI 309 Teaching in the Middle Years ..... 3
ECI 416 Teaching Exceptional Students in Mainstreamed Classroom ..... 3
ED 310 Tutoring Adolescents ..... 1
ELP 344 School and Society ..... 3
EMS 101 Orientation to Mathematics and Science Education ..... 0
EMS 203 Intro. to Teaching Mathematics and Science ..... 3
EMS 470 Methods and Materials for Teaching Mathematics[6] ..... 3
EMS 471 Student Teaching in Mathematics[6] ..... 4
EMS 474 Teaching Mathematics Topics in the Middle Years[6] ..... 3
EMS 475 Methods of Teaching Science[6] ..... 3
EMS 476 Student Teaching in Science ..... 4
PSY 476 Psychology of Adolescent Dev. ..... 3
36

Minimum Hours Required for Graduation ..... 128

[1] Must be chosen from the university's official lists for humanities and social sciences
[2] At least one of the indicated courses must be chosen from the University's non-English speaking culture's list
[3] Social science can not be a psychology course.
[4] Must be chosen from HI 321, 322,341,480, 481; PHI 340; MDS 301.
[5] Two P.E. credits do not count toward minimum for graduation
[6] These courses are taken together as a block in the fall semester only.
Student teaching is full-time for ten weeks.
** Courses are offered both Fall and Spring.

## CURRICULA IN SCIENCE EDUCATION
## Degree earned: B.S. in Science Education
Poe Hall, Room 326

G.S. Carter, *Coordinator*

## SED: Science Education Grades 9-12 Licensure
### REQUIREMENTS

| **General Studies (35-40 semester hours)** | Credits |
|---|---|
| *English and Communication Courses* | |
| ENG 111 Comp. and Rhetoric | 3 |
| ENG 112 Comp. and Reading | 3 |
| COM 110 Public Speaking | 3 |
| | 9 |
| *Humanities and Social Sciences Courses* | |
| History Elective[1, 2] | 3 |
| Literature Elective[1, 2] | 3 |
| Phil., Relig., Vis/Perf. Arts Elective[1, 2] | 3 |
| Social Science Elective[1, 2, 3] | 3 |
| Humanities/Soc.Sci. Elective[1, 2] | 3 |
| PSY 304 Educational Psychology | 3 |
| Sci./Technology/Soc. Elective[4] | 3 |
| Multicultural Elective[5] | 3 |
| | 24 |
| *Physical Education and Free Electives* | |
| Any 100-level PE in Fitness & Wellness | 1 |
| Physical Education Elective[6] | 3 |
| Free Electives | 0-5 |
| | 2-7 |
| **Specialization (52-67 semester hours)** | |
| **Biology (59-62)** | |
| *Specialization Courses* | |
| BO 200 Plant Life | 4 |
| BO 360 Intro. to Ecology | 3 |
| BO 365 Ecology Lab | 1 |
| BIO 125 General Biology | 4 |
| GN 301 Genetics in Human Affairs *or* | |
| GN 411 Prin. of Genetics | 3-4 |
| MB 351 General Microbiology *or* | |
| BCH 451 Introductory Biochemistry | 3-4 |
| ZO 201 General Zoology | 4 |
| ZO 421 Prin. of Physiology *or* | |
| ZO (BO) 414 Cell Biology *or* | |
| BO 421 Plant Physiology | 3 |
| | 25-27 |
| *Supporting Courses* | |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| CH 107 General Chemistry II | 3 |
| CH 127 Prin. of Chemistry Lab | 1 |
| CH 220 Introductory Organic Chemistry or | 4 |
| CH 221 Organic Chemistry I | |
| MA 131 Analytic Geom. & Calculus A *or* | |

MA 121 Elements of Calculus ..... 4
MA 231 Analytic Geom. & Calculus B *or*
ST 311 Intro. to Statistics ..... 3
MEA 101 Geology I: Physical ..... 3
MEA 110 Geology I: Lab ..... 1
PY 211 College Physics I ..... 4
PY 212 College Physics II ..... 4
Earth Science Elective ..... 3-4
34-35

**Chemistry (62-64)**

*Specialization Courses*

CH 101 General Chemistry I ..... 3
CH 121 General Chemistry I Lab ..... 1
CH 107 General Chemistry II ..... 3
CH 127 Prin. of Chemistry Lab ..... 1
CH 221 Organic Chemistry I ..... 4
CH 223 Organic Chemistry II ..... 4
CH 315 Quantitative Analysis ..... 4
CH 331 Intro. Physical Chemistry ..... 4
CH 401 Systematic Inorganic Chemistry I ..... 2
BACH. 451 Introductory Biochemistry ..... 3
Chemistry Elective ..... 3
32

*Supporting Courses*

BIO 125 General Biology ..... 4
MA 141 Analytic Geom. & Calculus I ..... 4
MA 241 Analytic Geom. and Calculus II ..... 4
MEA 101 Geology I: Physical ..... 3
MEA 110 Geology I: Lab ..... 1
PY 205 Physics for Engr. & Sci. I ..... 4
PY 208 Physics for Engr. & Sci. II ..... 4
Biological Science Elective ..... 3-4
Earth Science Elective ..... 3-4
30-32

**Earth Sciences (61-65)**

*Specialization Courses*

MEA 101 Geology I: Physical ..... 3
MEA 110 Geology I: Lab ..... 1
MEA 102 Geology II: Historical ..... 3
MEA 111 Geology II: Lab ..... 1
MEA 130 Intro. to Weather & Climate *or*
MEA 311 Physical Climatology ..... 3
MEA 200 Intro. to Oceanography ..... 3
MEA 410 Intro. to Geologic Materials ..... 4
MEA 451 Structural Geology ..... 4
PY 123 Astronomy ..... 3
Earth Science Electives ..... 6-8
31-33

*Supporting Courses*

BIO 125 General Biology ..... 4
CH 101 General Chemistry I ..... 3
CH 121 General Chemistry I Lab ..... 1
CH 107 Prin. of Chemistry II ..... 3
CH 127 Prin. of Chemistry Lab ..... 1

MA 131 Analytic Geom. & Calculus A *or*
MA 141 Analytic Geom. & Calculus I ..... 4
MA 231 Analytic Geom. & Calculus B *or*
MA 241 Analytic Geom. & Calculus II ..... 3-4
PY 211 College Physics I ..... 4
PY 212 College Physics II ..... 4
Biological Science Elective ..... 3-4
30-32

**Physics (64-67)**

*Specialization Courses*

PY 201 University Physics I *or*
PY 205 Physics for Engr. & Scientists I ..... 4
PY 202 University Physics II *or*
PY 208 Physics for Engr. & Scientists II ..... 4
PY 203 University Physics III *or*
PY 407 Intro. to Modern Physics ..... 3-4
PY 123 Astronomy ..... 3
Physics Electives ..... 16-17
(Recommended: PY 228, PY 411, PY 413. 30-32
PY 414, and PY 452)

*Supporting Courses*

BIO 125 General Biology ..... 4
CH 101 General Chemistry ..... 3
CH 121 General Chemistry I Lab ..... 1
CH 107 Prin. of Chemistry II ..... 3
CH 127 Prin. of Chemistry Lab ..... 1
MA 141 Analytic Geom. & Calculus I ..... 4
MA 241 Analytic Geom. & Calculus II ..... 4
MA 242 Analytic Geom. & Calculus III ..... 4
MA 341 Applied Diff. Equations ..... 3
MEA 101 Geology I: Physical ..... 3
MEA 110 Geology I: Lab ..... 1
Biological Science Elective ..... 3-4
34-35

**Professional Studies (29 semester hours)**
(required of all students)

ECI 416 Teaching Exceptional Students in Mainstreamed Classroom ..... 3
ED 310 Tutoring Adolescents ..... 1
ELP 344 School and Society ..... 3
EMS 101 Orientation to Mathematics and Science Education ..... 0
EMS 203 Intro. to Teaching Mathematics and Science ..... 3
EMS 475 Methods of Teaching Science[~] ..... 3
EMS 476 Student Teaching in Science[~] ..... 8
EMS 477 Instructional Materials in Science[~] ..... 3
EMS 495 Senior Seminar in Mathematics & Science Education[~] ..... 2
PSY 476 Psychology of Adolescent Dev. ..... 3
29

Minimum Hours Required for Graduation ..... 128

[1] Must be chosen from the university's list for approved humanities and social sciences courses.
[2] At least one of the indicated courses must be chosen from the Non-English speaking cultures list.

[3] Social Science elective cannot be a Psychology course.
[4] Chosen from HI 321, HI 322, HI 341, HI 480, HI 481, PHI 340, MDS 301.
[5] Chosen from ANT 252, COM/ANT/HSS 392, SOC 305, ECI 305.
[6] Two PE credits do not count toward the minimum for graduation.
[7] Taken together as a block in the Fall only. Student teaching is full-time for 10 weeks.

## MSS: MIDDLE SCHOOL SCIENCE (WITH MATHEMATICS): Grades 6-9 Licensure

J.C. Park, *Coordinator*

### REQUIREMENTS

| **General Studies (55 semester hours)** | Credits |
|---|---|
| *English and Communication Courses* | |
| ENG 111 Comp. and Rhetoric | 3 |
| ENG 112 Comp. and Reading | 3 |
| COM 110 Public Speaking | 3 |
| | 9 |
| *Humanities and Social Sciences Courses* | |
| Literature Elective[1, 2] | 3 |
| History Elective[1, 2] | 3 |
| Phil., Relig., Vis/Perf. Arts Elective[1, 2] | 3 |
| Humanities/ Soc. Sci. Elective[1, 2] | 3 |
| Sci./Technology/Soc. Elective(HI 321, 322, 341, 480, 481; PHI 340; MDS 301) | 3 |
| PSY 304 Educational Psychology | 3 |
| Multicultural Elective[2](ANT 252, COM/ANT/HSS 392, SOC 305, ECI 305) | 3 |
| Social Science Elective[1, 2, 3] | 3 |
| | 24 |
| *Mathematics Courses* | |
| MA 131 Analytic Geom. and CalculusA *or* | |
| MA 141 Analytic Geom. and Calculus I | 4 |
| MA 231 Analytic Geom. and Calculus B *or* | |
| MA 241 Analytic Geom. and Calculus II | 3-4 |
| | 7-8 |
| *Physical Education* | |
| Any 100-level PE in Fitness & Wellness | 1 |
| Physical Education Electives | 3 |
| PEH 280 Responding to Emergencies *or* | |
| PEH 285 Personal Health | 2 |
| | 6 |

| **Teaching Major (38 semester hours)** | |
|---|---|
| BO 200 Plant Life or ZO 201 General Zoology | 4 |
| BIO 125 General Biology | 4 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| CH 107 General Chemistry II | 3 |
| CH 127 Prin. of Chemistry Lab | 1 |
| MA 114 Intro. to Finite Mathematics | 3 |
| MA 225 Foundations of Advanced Mathematics | 3 |
| MA 308 College Geom. | 3 |
| MEA 101 Geology I: Physical | 3 |
| MEA 110 Geology I Lab | 1 |
| BO 360/365 Ecology/Lab | 3-4 |

PY 131 Conceptual Physics ..... 4
PY 123 Astronomy ..... 3
MEA 130/131 Weather & Climate/Lab ..... 3-4
ST 311 Intro. to Statistics ..... 3
Science Elective ..... 2
47-49

**Professional Studies (35 semester hours)**

ECI 306 Middle Years Reading ..... 3
ECI 309 Teaching in the Middle Years ..... 3
ECI 416 Teaching Exceptional Students in Mainstreamed Classroom ..... 3
ED 310 Tutoring Adolescence ..... 1
ELP 344 School and Society ..... 3
EMS 101 Orientation to Mathematics and Science Education ..... 0
EMS 203 Intro. to Teaching Mathematics and Science ..... 3
EMS 475 Methods of Teaching Science~ ..... 3
EMS 476 Student Teaching in Science~ ..... 8
EMS 477 Instructional Materials in Science~ ..... 3
EMS 495 Senior Seminar in Mathematics and Science Education~ ..... 2
PSY 476 Psychology of Adolescent Dev. ..... 3
35

Minimum Hours Required for Graduation ..... 128

[1] Must be chosen from the university's list for approved courses in this area.
[2] At least one of the indicated courses must be chosen from the Non-English speaking cultures
[3] Cannot be a psychology course

## CURRICULA IN TECHNOLOGY EDUCATION
## Degree earned: B.S. in Technology Education

502 Poe Hall

W.J. Haynie III, *Coordinator*

## TED: LICENSURE OPTION

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| EOE 101 Intro. to Occ. Education | 1 | ENG 112 Comp. and Reading | 3 |
| ENG 111 Comp. and Rhetoric | 3 | Math., Statistics, or Logic[1] | 3 |
| GC 120 Foundations of Graphic Comm. | 3 | Humanities/Soc Sci Elective[2,5] | 3 |
| Math Elective | 3 | Natural Sciences--Basic[3] | 3-4 |
| TED 115 Wood Processing | 4 | TED 122 Metal Technology | 4 |
| Any 100-level PE in Fitness & Wellness | 1 | Physical Education Elective | 1 |
| | 15 | | 17-18 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| EOE 207 Intro. to Teaching Occ. Education | 3 |
| GC 200 Applied Computer Aided Drawing | 3 |
| Natural Science--Basic[3] | 3-4 |
| Speech Elective[2] | 3 |
| TED 246 Graphic Arts Technology | 4 |
| Physical Education Elective | 1 |
| | 17-18 |

| *Spring Semester* | *Credits* |
|---|---|
| Humanities/Soc Sci Elective[2,4] | 3 |
| Literature Elective[2] | 3 |
| Natural Science Elective[3] | 3-4 |
| TED 221 Construction Technology | 3 |
| Physical Education Elective[7] | 1 |
| | 13-14 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ED 310 Tutoring Adolescents | 1 |
| ELP 344 School and Society | 3 |
| Math, Natural Science, or STS Elective | 3 |
| PSY 304 Educational Psychology[2] | 3 |
| TED 359 Electrical Technology I | 3 |
| TED 376 Transportation:Energy & Power Technology | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| History Elective[2] | 3 |
| PSY 376 Developmental Psychology[2] | 3 |
| TED 461 Comm. Technology | 3 |
| TED 384 Computer Applications in Industry | 3 |
| Free Elective | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Economics, Soc, Pol & Gov, Anth, or Cult Geog[2] | 3 |
| ECI 451 Improving Reading in Secondary Schools | 2 |
| EOE 456 Curr. & Methods in Technology Education | 3 |
| TED 430 Mfg. Technology | 3 |
| Free Elective | 3 |
| | 14 |

| *Spring Semester* | *Credits* |
|---|---|
| EOE 452 Lab Planning in Technology Education | 3 |
| EOE 457 Student Teaching in Technology Education | 8 |
| EOE 495 Senior Seminar in Technology Education | 3 |
| | 14 |

Minimum Hours Required for Graduation ..... 121[6]

Notes:
1.From approved list of Mathematics, Statistics, and Logic courses.
2.Part of the Second Academic Concentration--Multidisciplinary Studies in Humanities and Social Sciences (code 4903).
3.Three courses (11 credits) from natural sciences including two from different basic sciences (biology, chemistry, earth sciences, or physics--see approved list). Two of these three courses must have a lab.
4.Must focus on a non-English speaking culture.
5.One of these courses must be selected from either the STS-Humanities and Social Science Perspective List or the STS-Science and Technology Perspective List.
6.Foreign language proficiency at the FL 102 level or above must be demonstrated prior to graduation.
7. Two PE credits do not count toward the minimum hours for graduation.

# TED: NON-LICENSURE OPTION

## FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| EOE 101 Intro. to Occ. Education | 1 |
| ENG 111 Comp. and Rhetoric | 3 |
| GC 120 Foundations of Graphic Comm. | 3 |
| Math Elective | 3 |
| TED 115 Wood Processing | 4 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 112 Comp. and Reading | 3 |
| Math., Statistics, or Logic[1] | 3 |
| Humanities/Soc Sci Elective[5] | 3 |
| Natural Sciences--Basic[2] | 3-4 |
| TED 122 Metal Technology | 4 |
| Physical Education Elective[7] | 1 |
| | 17-18 |

## SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| EOE 207 Intro. to Teaching Occ. Education | 3 |
| GC 200 Applied Computer Aided Drawing | 3 |
| Natural Science--Basic[2] | 3-4 |
| Adv Writing, Comm/Speech, or Adv FL | 3 |
| TED 246 Graphic Arts Technology | 4 |
| Physical Education Elective[7] | 1 |
| | 17-18 |

| *Spring Semester* | *Credits* |
|---|---|
| Humanities/Soc Sci Elective[3] | 3 |
| History or Literature Elective | 3 |
| Natural Science Elective[2] | 3-4 |
| TED 221 Construction Technology | 3 |
| Free Elective[3] | 3 |
| Physical Education Elective[7] | 1 |
| | 16-17 |

## JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| EC 201 Economics I | 3 |
| ELP 344 School and Society | 3 |
| Math, Natural Science, or STS Elective | 3 |
| Psychology Elective | 3 |
| TED 359 Electrical Technology I | 3 |
| TED 376 Transportation:Energy & Power Technology | 3 |
| | 18 |

| *Spring Semester* | *Credits* |
|---|---|
| History or Literature Elective | 3 |
| Psychology Elective | 3 |
| TED 461 Comm. Technology | 3 |
| TED 384 Computer Applications in Industry | 3 |
| BUS 360 Marketing Methods | 3 |
| | 15 |

## SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| TED 430 Mfg. Technology | 3 |
| Economics or Business Elective | 3 |
| Advised Technical Elective[4] | 3 |
| Free Elective | 3 |
| Free Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| EOE 452 Lab Planning in Technology Education | 3 |
| EOE 307 Field Work in OED | 6 |
| EOE 495 Senior Seminar in Technology Education | 3 |
| | 12 |

Minimum Hours Required for Graduation ..... 122[6]

Notes:

[1]From approved list of Mathematics, Statistics, and Logic courses.

[2]Three courses (11 credits) from natural sciences including two from different basic sciences (biology, chemistry, earth sciences, or physics--see approved list). Two of these three courses must have a lab.

[3]Must focus on a non-English speaking culture.

[4]From TED, GC, MA, Sciences, Design, or Engineering.

[5]One of these courses must be selected from either the STS-Humanities and Social Science Perspective List or the STS-Science and Technology Perspective List.

[6]Foreign language proficiency at the FL 102 level or above must be demonstrated prior to graduation.
[7] Two PE credits do not count toward the minimum hours for graduation.

## MINOR IN GRAPHIC COMMUNICATIONS

Poe Hall, Room 510

A.Y. Scales, *Coordinator*

This 15 hour minor develops competencies in selecting and applying graphic techniques in both career and leisure activities, provides in-depth manual and computer skills, and enriches visual perception and critical thought in graphic areas. Minor programs are individually designed to meet the needs of the student and to fit with the student's major, such as in engineering or technology education.

## SOCIAL STUDIES TEACHER EDUCATION

K. A. Troost, *Coordinator of Advising, Sociology*

J. A. Mulholland, *Coordinator of Advising, History*

J. H. Gilbert, *Coordinator of Advising, Political Science*

Students desiring to become secondary social studies teachers in grades 9-12 will be enrolled in the College of Humanities and Social Sciences. Curriculum requirements for the teacher education options can be found under history, political science and public administration, and sociology and anthropology in that College's section. Students desiring to become social studies teachers in grades 6-9 will be enrolled in the College of Education and Psychology.

## SPANISH TEACHER EDUCATION

L. Salstad, *Coordinator of Advising*

Students desiring to become teachers of Spanish will be enrolled in the College of Humanities and Social Sciences. The curriculum requirements for the teacher education option is Spanish can be found under Foreign Languages and Literatures in that College's section.

# DEPARTMENT OF PSYCHOLOGY

Poe Hall, Room 640

D.W. Martin, *Head*

S. S. Snyder, *Associate Head and Coordinator of Advising*

*Alumni Distinguished Undergraduate Professors*: K.W. Klein, D.H. Mershon, S.S. Snyder; *Professors*: J.W. Cunningham, D.W. Drewes, W.P. Erchul, T.M. Hess, J.W. Kalat, T.E. LeVere, J.E.R. Luginbuhl, D.W. Martin, D.H.Mershon, J.J. Michael, S.E. Newman, F.J. Smith, B.W. Westbrook; *Adjunct Professors*: J.L. Howard, W. Tornow, L.G. Tornatsky; *Professors Emeriti*: K.L.Barkely, J.C. Johnson, H.G.Miller, P.W. Thayer, *Associate Professors*: L.E. Baker-Ward, C.C.Brookins, S.A. Converse, D.O. Gray, A.G. Halberstaldt, P.F. Horan, M.E. Haskett, K.W. Klein, R.W. Nacoste, S.B.Pond, A.C. Shulte, M.A. Wilson, M.S. Wogalter; *Adjunct Associate Professors*: B.A. Braddy-Burrus, B.F. Corder, A.D. Hall; *Associate Professors Emeriti*: J.L. Cole, R.F. Rawls; *Clinical Assistant Professors*: M.Y. Bingham, P.W. Collins; *Adjunct Assistant Professors*: B.H. Beith, J.W. Fleenor, C.L. Kronberg, C.E. Lorenz, S.N. Palmer, B.H. Rogers; *Associate Members of the Faculty*: C.D. Korte (Multidisciplinary Studies), R.G. Pearson (Industrial Engineering), J.L.Wasik (Statistics).

Psychology is one of the basic majors in liberal arts and sciences. Psychologists use the methodology of science to study human behavior and experience. A bachelor's degree in psychology forms an excellent foundation for careers in business and government, as well as enhancing life skills such as parenting and human social interaction. Students can also use this degree as an entry into further education leading to an advanced degree in applied or experimental psychology, or to such fields as law, medicine, business or social work.

There are two programs for undergraduate majors in psychology: The General Option (PSY) and Human Resource Development (HRD). Each emphasizes different aspects of psychology. Separate descriptions of these programs are included in the next section.

## HONORS PROGRAMS

Within the General Option and the Human Resource Option, there are honors tracks which provide special curricula and opportunities to work with faculty on research projects. Students must have completed a minimum of 45 semester hours of course work (at least 15 at NC State) and have a grade point average of 3.250 or better to be considered for admission to an honors program. More details as to admission and requirements are available from the Psychology Department.

All undergraduate majors are members of the Psychology Club, which provides a number of enrichment activities, including sponsorship of the Carolinas Psychology Conference. One of the largest undergraduate conferences in the United States, it is held annually in cooperation with Meredith College and other Cooperating Raleigh

Colleges. There is also an active chapter of Psi Chi, the national psychology honor society, which provides enrichment to the program.

## CURRICULUM IN PSYCHOLOGY - GENERAL OPTION

The General Option is oriented toward the student who wants a broad understanding of the types of problems with which psychology is concerned and the ways in which psychologists approach and attempt to solve these problems. Curriculum requirements in the General Option are sufficiently flexible for students to concentrate, if they wish, in another area of study as well as psychology, and thereby prepare themselves for a variety of careers or professional programs. By wise choice of elective courses, a student can prepare for medical, legal, business, or education graduate training, while at the same time acquiring a basic background in the social sciences.

## CURRICULUM IN PSYCHOLOGY, GENERAL OPTION
### Degree earned: B.A. in Psychology

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 105 Biology in Modern World | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| PSY 200 Intro. to Psychology | 3 |
| Mathematics Elective[1] | 4 |
| Any 100-level PE course in Fitness & Wellness | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 112 Comp. & Reading | 3 |
| Social Science Elective[3] | 3 |
| Natural Science Elective[4] | 3-4 |
| Philosophy Elective[5] | 3 |
| Physical Education Elective[2] | 1 |
| Free Elective | 3 |
| | 16-17 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| PSY 240 Intro. to Behavioral Research I | 3 |
| PSY 241 Intro. to Behavioral Res. I Lab | 1 |
| Humanities/ Soc. Sci. Elective[6] | 3 |
| Literature Elective[7] | 3 |
| Mathematics Elective[1] | 3-4 |
| Physical Education Elective | 1 |
| | 14-15 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 200 Intro. to Computers & Their Uses | 3 |
| PSY 242 Intro. to Behavioral Research II | 3 |
| PSY 243 Intro. to Behavioral Res. II Lab | 2 |
| Humanities/Soc. Sci. Elective[6] | 3 |
| Natural Science Elective[4] | 3-4 |
| Philosophy Elective (restricted)[8] | 3 |
| Physical Education Elective | 1 |
| | 18-19 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| PSY Elective[9] | 3 |
| PSY-Group 1[10] | 3 |
| Restricted Elective[11] | 3 |
| Speech or Technical Writing Elective[12] | 3 |
| Sci./Technology/Soc. Elective[13] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| PSY-Group 1[10] | 3 |
| PSY-Group 2[14] | 3 |
| Literature Elective[7] | 3 |
| Restricted Elective[11] | 3 |
| Free Elective | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| PSY-Group 2[14] | 3 |
| PSY Elective[9] | 3 |
| Restricted Elective[11] | 6 |
| Free Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| PSY-Group 2[14] | 3 |
| Restricted Elective[11] | 3 |
| Free Electives | 6-9 |
| | 12-15 |

Minimum Hours Required for Graduation ..... 122[15]

[1]Any two MA prefix courses from the approved GER Mathematics Electives list.
[2]Any 100-level PE in Fitness & Wellness and one other, one credit course counts toward minimum credit hours required for graduation. Two other, one-credit PE courses do not count toward minimum for graduation.
[3]Taken from approved GER lists of Electives in Economics, Politics and Government, Sociology, Anthropology, or Cultural Geography. This course or one of the two Humanities or Social Science Electives must focus on a non-English speaking culture (see Footnote 6).
[4]Two courses (at least one of which is NOT a biological science) from the GER Natural Sciences (Biology, Chemistry, Earth Science, Physics) List. At least one of these must include a lab experience. GN 301, GN 411, MB 200, and ZO(MEA) 220 are considered biological sciences that meet this requirement.
[5]Taken from the approved GER Philosophy Electives list.
[6]Taken from the GER Electives lists in Cultural Geography, Economics, History, Politics and Government, Sociology, or Anthropology, or from the approved subset of the Humanities and Social Sciences Additional Electives List. One of these courses or the Social Science Elective must focus on a non-English speaking culture (see Footnote 3).
[7]Taken from the approved GER Literature Electives list.
[8]Taken from LOG 201,or PHI 311, 332, 335 or 340, or CSC(MA)222.
[9]Any course taught in the Psychology Department.
[10]Taken from PSY 400, 410, 420, 430, 505.
[11]Chosen in consultation with Advisor from list of Psychology Department Approved Restricted Electives.
[12]Taken from ENG 331, 332, 333 or COM 110, 112, 201, or 202.
[13]Taken from approved GER Science, Technology, and Soc. (Science and Technology Perspective) list.
[14]Group 2 Psychology Electives are three courses, one course from three of the following five categories: I. PSY 307 or 340; II. PSY 376, 475, or 476; III. PSY 370, 470; IV. PSY 311 or 412; V. PSY 436.

## MINOR IN COGNITIVE SCIENCE

The Departments of Psychology, and Philosophy and Religion offer an interdisciplinary minor in cognitive science. The minor provides a general introduction to contemporary interdisciplinary research within the framework of the "computer model" mind, and offers the student the opportunity for in-depth study of selected topics of such as the nature of human information processing, the acquisition and use of lamachine intelligence.

To complete the minor, 15 hours are required, distributed as follows: PSY 320 (Cognitive Processes); PSY 340 (Ergonomics) *or* PSY 545 (Human Information Processing); PHI 331 (Philosophy of Language); PHI 332 (Philosophy of Psychology); PHI/PSY 425/525 (Introduction to Cognitive Science).

## MINOR IN PSYCHOLOGY

The Psychology Department offers a minor in psychology to majors in any field except psychology. To complete the minor, eighteen hours of courses are required, six of these hours in the basic science of psychology, and nine in the applied aspects of psychology. PSY 200 is a required prerequisite. All must be passed with a grade of "C" or better.

## CURRICULUM IN PSYCHOLOGY
## HUMAN RESOURCE DEVELOPMENT

The Human Resource Development (HRD) Option is designed to provide a groundwork of skills and experience for students who wish to enter human service careers with a B.A. degree. With appropriate curriculum modifications, the program can also provide a sound background for students who wish to go into advanced degree programs in psychology, management, personnel, social work, counseling, guidance, education, and other areas. Students interested in graduate school should confer with their advisors in order to plan an appropriate course of study.

The HRD Option focuses on enabling students to gain direct experience in the areas in which they would like to work. HRD students devote a semester to learning principles and skills related to working with human problems, and subsequently each HRD student spends a semester working part-time or full-time in a job related to his/her own area of interest. The HRD Option accepts a maximum of 20 students each year. Interested students can apply for admissions to HRD during the spring semester of their sophomore or junior year. Further information about the HRD option is available through the Psychology Department office.

# CURRICULUM IN PSYCHOLOGY
# HUMAN RESOURCE DEVELOPMENT OPTION
## Degree earned: B.A. in Psychology

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 105 Biology in Modern World | 4 |
| ENG 111 Comp. & Rhetoric | 3 |
| PSY 200 Intro. to Psychology | 3 |
| Mathematics Elective[1] | 4 |
| Any 100-level PE course in Fitness & Wellness[2] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 112 Comp. & Reading | 3 |
| Social Science Elective[3] | 3 |
| Natural Science Elective[4] | 3-4 |
| Philosophy Elective[5] | 3 |
| Physical Education Elective[2] | 1 |
| Free Elective | 3 |
| | 16-17 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| PSY 240 Intro. to Behavioral Research I | 3 |
| PSY 241 Intro. to Behavioral Res. I Lab | 1 |
| Humanities/ Soc. Sci. Elective[6] | 3 |
| Literature Elective[7] | 3 |
| Mathematics Elective[1] | 3-4 |
| Physical Education Elective | 1 |
| | 14-15 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 200 Intro. to Computers & Their Uses | 3 |
| PSY 242 Intro. to Behavioral Research II | 3 |
| PSY 243 Intro. to Behavioral Res. II Lab | 2 |
| Humanities/Soc. Sci. Elective[6] | 3 |
| Natural Science Elective[4] | 3-4 |
| Philosophy Elective (restricted)[8] | 3 |
| Physical Education Elective | 1 |
| | 18-19 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| PSY 350 Human Res. Dev. Skills | 3 |
| PSY 495 HR Dev. Practicum | 3 |
| Restricted Elective[10] | 3 |
| Speech or Technical Writing Elective[11] | 3 |
| Sci./Technology/Soc. Elective[12] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| PSY 495 HR Dev. Practicum | 3 |
| PSY 499 Indep. Study in Psy. | 4 |
| Literature Elective[7] | 3 |
| COM 112 Interpersonal Comm.. | 3 |
| PSY 210 or 412 | 3 |
| | 16 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| PSY Electives[9] | 6 |
| Restricted Electives[10] | 6 |
| Free Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| PSY Elective[9] | 3 |
| Free Electives | 9 |
| | 12 |

Minimum Hours Required for Graduation ..... 122[1]

[1]Any two MA prefix courses from the approved GER Mathematics Electives list.
[2]Any 100-level PE in Fitness & Wellness and one other, one-credit course count toward minimum credit hours required for graduation. Two other, one-credit PE courses do not count toward minimum for graduation.

[3]Taken from approved GER list of Economics, History, Politics and Government, Sociology, Anthropology, or Cultural Geography. This course or one of the two Humanities or Social Science courses must focus on a non-English speaking culture.
[4]Two courses(at least one of which is not a biological science) from the GER Natural Sciences (Biology, Chemistry, Earth Sciences, and Physics) list. At least one of these must include a lab experience. GN301, GN 411, MB 200, and ZO(MEA)220 are also accepted and are considered a biological science in meeting this requirement.
[5]Taken from the approved GER Philosophy Electives list.
[6]Taken from GER Electives lists in Economics, History, Politics and Government, Sociology, or Anthropology, or from the approved subset of the Humanities and Social Sciences Additional List. One of these courses or the Social Science Elective must focus on a non-English speaking culture (see Footnote 3)
[7]Taken from the approved GER Literature Electives list.
[8]Taken from LOG 201, or PHI 311, 321, 332, 335, 340 or CSC(MA)222.
[9]Any course taught in the Psychology Department.
[10]Chosen in consultation with Advisor from list of Psychology Department Approved Restricted Electives.
[11]Taken from ENG 331, 332, 333 or COM 110, 201, or 202.
[12]Taken from approved GER Sci., Technology, and Soc. Elective (Science and Technology Perspective) list.

# COLLEGE OF ENGINEERING

*Page Hall, Rooms 118 and 120*
*NCSU Box 7904*
*Raleigh, NC 27695-7904*

*Phone:* *(919) 515-2315*
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N. A. Masnari, *Dean*

S. A. Rajala, *Associate Dean for Academic Affairs*

J. G. Gilligan, *Associate Dean for Research and Graduate Programs*

R. M. Turner, *Assistant Dean for Student Services*

R. L. Porter, *Assistant Dean for Academic Affairs*

T. K. Miller, *Assistant Dean for Information Technology*

Men and women who seek a challenging technical career in research and development, design, construction, production, maintenance, technical sales, management, teaching, or other careers requiring a methodical, creative solution of problems, should consider an engineering or computer science education. At NC State, the College of Engineering has a distinguished and internationally recognized faculty. The faculty, together with the curricula of the undergraduate and graduate programs, offer an opportunity for ambitious men and women to become the leaders and prime movers of our increasingly technological world. Because of the great influence of science and technology on our everyday lives, today's engineers and computer scientists must be acutely aware of, and responsible for, the impact that their creations may have on society. In addition to safety, aesthetics, economics, and energy, today's technologist must consider environmental, sociological, and other "human concern" costs.

The college's 30,000 graduates may be found in widely diversified careers throughout the world. Most are practicing in the engineering profession, but because their education has equipped them well to deal with problems in a wide variety of fields, many College of Engineering graduates have become corporate presidents, leaders in government, lawyers, and medical doctors.

The College of Engineering is organized into ten departments: Biological and Agricultural Engineering; Chemical Engineering; Civil Engineering; Computer Science; Electrical and Computer Engineering; Industrial Engineering; Materials Science and Engineering; Mechanical and Aerospace Engineering; Nuclear Engineering; and Textile Engineering, Chemistry and Science. Sixteen undergraduate degree programs are offered in these ten departments. In addition, a degree program in Engineering is offered by special arrangement to the very few students who can clearly demonstrate the need for an individualized program of study. All departments also offer advanced studies leading to professional degrees, master's degrees and the Doctor of Philosophy degree. (Consult the *Graduate Catalog* for graduate degrees.)

The College of Engineering requests and receives accreditation from the Engineering Accreditation Commission of the Accrediting Board for Engineering and Technology (ABET) for thirteen of its undergraduate engineering degree programs. These are aerospace engineering, biological engineering, chemical engineering, civil engineering, civil engineering-construction option, computer engineering, electrical engineering, environmental engineering, industrial engineering, materials science and engineering, mechanical engineering, nuclear engineering, and textile engineering. The program in computer science is accredited by the Computer Science Accreditation Commission (CSAC) of the Computing Sciences Accreditation Board (CSAB). Accreditation insures that these programs satisfy requirements for acceptance by these nationally recognized agencies. All curricula and programs are designed to maintain the college's national and international reputation while meeting the needs of the people and industries of the state and region through effective instruction, competent research, and the development of new and meaningful contributions to scientific knowledge.

A Career Planning and Placement Center is maintained by the university to assist continuing students and graduating students in achieving their career goals.

## UNDERGRADUATE CURRICULA AND DEGREES

Entering students receive assistance in planning an appropriate program of study and have available continued guidance from academic advisors throughout their academic careers. Beginning freshmen are enrolled in the Engineering Undesignated program for one to two years. After successfully completing Engineering Undesignated requirements, students may be admitted to a specific department. In order to be eligible to apply for admission into a degree program, Engineering Undesignated students must successfully complete at least 28 credit hours, including the following courses: MA 141

and MA 241; PY 205; ENG 111; E 115; CH 101, CH 121, and one of either CH 107 or CSC 110/112/114.

****University Physical Education requirements have been modified. It is recommended that students consult with their adviser on specific curriculum requirements regarding PE.*

**Prerequisite requirement for all engineering courses** - Before a student in the College of Engineering may enroll in a 200 or higher level engineering course, the student must have earned a grade of "C" or higher in ENG 111, MA 141, MA 241, PY 205, CH 101, and CH 121, and the student must have successfully completed E 115, and one of either CH 107, CSC 110, CSC 112, or CSC 114.

**Bachelor of Science** - The baccalaureate program provides preparation for entry into industry, government, business or private practice as well as graduate school. Graduates with a B.S. degree in engineering or computer science may be engaged in design development, production, construction, sales, maintenance, or the planning, operation or management of industrial units.

The undergraduate curricula offer programs of study leading to bachelor's degrees in aerospace engineering, biological engineering, chemical engineering, civil engineering, construction engineering and management, computer engineering, computer science, electrical engineering, engineering, environmental engineering, industrial engineering, industrial engineering-furniture manufacturing option, materials science and engineering, mechanical engineering, nuclear engineering, and textile engineering. Graduation requirements include completion of one of the sixteen curricula with an overall grade point average of 2.000 and a grade point average of 2.000 in the major courses. The total number of required credits ranges from 120 to 128 semester hours.

## ENGINEERING SCHOLARS PROGRAM

The **Engineering Scholars Program** has as its goal the promotion of research and academic careers in engineering and computer science. Under the sponsorship of the College of Engineering, in cooperation with the Division of Student Affairs, scholars begin by living together and participating in special educational seminars, cultural enrichment activities, and special scholars sections in some courses. In the sophomore year, Engineering Scholars may begin research apprenticeships with faculty members throughout the College of Engineering. Additional information may be obtained by contacting departmental program representatives.

## DOUBLE DEGREE PROGRAMS

NC State students may wish to earn Bachelor of Science degrees in two fields of engineering or in computer science and an engineering field. When the two courses of study are planned early and carefully, a number of courses can simultaneously satisfy requirements in both degrees. Humanities, social science, physics, mathematics, chemistry, English and physical education sequences are common to most curricula. In addition, required courses in one curriculum can sometimes be used as electives in another field. A well-planned double degree program can be completed in five years. Students interested in such a program should consult the Assistant Dean for Student Services.

Other students may wish to combine a Bachelor of Science in engineering or computer science with a Bachelor of Science or Bachelor of Arts degree in another college or school at North Carolina State University. Here also, a number of courses required for one degree may also satisfy requirements for a second degree. When the two courses of study are planned early and carefully, a double-degree program can be completed in as few as five years. Students interested in such a program should contact the Assistant Dean for Student Services.

## BENJAMIN FRANKLIN SCHOLARS PROGRAM

A limited number of freshmen in the College of Engineering are selected to participate in the Benjamin Franklin Scholars program. In addition to their major courses, each Benjamin Franklin Scholar develops an individualized, five-year plan of work focused on a central theme in the humanities and social sciences. Students completing the program receive a Bachelor of Science in an engineering discipline or computer science and a bachelor's degree in multidisciplinary studies.

This double-degree program provides a unique opportunity to integrate a solid base of knowledge in technology or science with a broad philosophical perspective of the humanities. The curriculum for the double-degree program has four main components: a strong general education, specially designed interdisciplinary and problem-defining courses, all technical course requirements associated with the engineering or computer science degree, and a 30 hour multidisciplinary concentration designed by students in consultation with their advisors. With careful planning, this program can be completed in five years.

For more information, contact the Assistant Dean for Academic Affairs in the College of Engineering (118 Page Hall), or the Assistant Dean for Undergraduate Affairs in the College of Humanities and Social Sciences (106 Caldwell Hall).

## TRANSFER PROGRAM

Students with non-engineering degrees or one or more years of academic work completed at other institutions may apply for transfer admission to the College of Engineering through the University Admissions Office. Students are admitted from appropriate programs from four-year institutions, as well as junior and community colleges.

Students currently attending or anticipating attendance at other institutions are advised to contact the Assistant Dean for Student Services for information regarding admission to NC State and credit for courses taken elsewhere.

## PROFESSIONAL DEGREES IN ENGINEERING

The College of Engineering offers post-baccalaureate curricula leading to the degrees of Aerospace Engineer, Civil Engineer, and Mechanical Engineer. These programs of study are designed to fit the needs of students desiring intensive specialization in a particular field, or additional work not ordinarily covered in the normal undergraduate curricula.

## PURCHASE OF COMPUTERS BY COLLEGE OF ENGINEERING STUDENTS

During their first semester, new freshmen in the college enroll in a computer literacy course, E 115, which is taught using the EOS student computing facility. Following completion of E 115, it is expected that students will incorporate use of EOS workstations into all curricular areas, including the preparation of reports and papers in non-technical subjects. In either the freshman or sophomore year, most students will complete a course in computer programming and, thereafter, will increasingly use computers as an engineering tool. The College policy is that all of its students will be provided with the computing resources required to successfully complete their course of study. However, some students may find that owning a computer is beneficial in terms of convenience and ready access to computational capability. Since different departments within the College have different course and computer language requirements, the College recommends that new students who decide to purchase a personal computer should not do so until they have been admitted into a degree program.

## INTERNATIONAL OPPORTUNITIES

The College is actively working to provide its students with opportunities for overseas work and study experience. In addition to the study abroad program which is available to all students at NC State, College of Engineering students can participate in an exchange program with the Université de Technology de Compiègne in Compiègne, France. Alternatively, through the College of Textiles, students interested in France can participate in an exchange program at the Catholic University of Lille, France. Students interested in Japan can participate in one of several programs offered by EAGLE, the Engineering Alliance for Global Education.

## HUMANITIES AND SOCIAL SCIENCES

Each student in the College of Engineering is required to take a minimum of 21 credit hours of humanities and social science courses. **At least one course used to fulfill the requirements must be selected from the list of courses which focus on a non-English speaking culture**. All of the courses used to satisfy the humanities and social science requirement must be taken from the College of Engineering list of approved courses and all must be completed with regular grading. The courses will be distributed as designated below:

1. Select a beginning economics course, EC 201 or ARE 201.
2. Select two courses from the list of history courses or two courses from the list of literature courses. At least one course must be at the advanced level. History courses must be selected from the same group and literature courses must be taken from the same language.
3. Select one course from the list of philosophy, religion, and visual/performing arts courses.
4. Select one course from the list of science, technology, and society courses.
5. Select one course from the following social science areas: anthropology, cultural geography, politics and government, psychology, or sociology.
6. Select one advanced course from the following social science areas: anthropology, economics, politics and government, psychology, or sociology. The advanced course must be selected from an area in which an introductory course has been completed.

## COOPERATIVE EDUCATION PROGRAM

This optional program is structured so that the student will alternate semesters of study with semesters of practical work as sophomores and juniors. The freshman and senior years are spent on campus, while sophomore and junior academic work is spread over a three-year period to permit alternating academic semesters with work-experience semesters. Students earn a salary while they are in industry, and they may earn a sufficient income to finance much of their college education. The co-op plan can be completed in five years, during which time the student receives 12 to 18 months of industrial experience.

Students in all curricula in the College of Engineering may apply for the co-op program if they have a grade-point average of 2.250 or better. After a student has been accepted for employment, he or she is expected to maintain at least a 2.000 grade-point average. Application for admission into the co-op program should be made early in the spring semester of the freshman year; however, later applications resulting in fewer work semesters prior to graduation will be considered during the sophomore year or the first semester of the junior year. Engineering Undesignated students must be admitted into an engineering degree program prior to beginning the first co-op assignment. Further information may be obtained from the Cooperative Education Program, 212 Peele Hall.

## STUDENT ACTIVITIES

Each curriculum in the College of Engineering has a technical society open to every student enrolled in the curriculum. In most cases, these are student chapters of national professional organizations. Each curriculum also has one or more honor societies to give recognition to students who have earned superior academic records. In addition, there are college-wide honor, professional, and service societies that offer personally and educationally rewarding opportunities for students.

Student representatives of each curriculum serve on the Engineers' Council. The Council is the coordinating agency for college-wide activities such as the Engineering Fundamentals Examination review classes, the Engineers' Week Exhibition, the annual St. Patrick's Day Dance, and the *N. C. State Engineer* student publication.

## WORLD WIDE WEB ADDRESS

An extensive database of information about activities and programs in the College of Engineering is available for viewing on the World Wide Web. The URL for the College of Engineering Home Page is: http://www/eos.ncsu.edu/coe/

# DEPARTMENT OF BIOLOGICAL AND AGRICULTURAL ENGINEERING

David S. Weaver Laboratories, Room 100
(Also see Agriculture and Life Sciences.)

D. B. Beasley, *Head*

F. J. Humenik, *Department Extension Leader and Associate Head*

J. H. Young, *Director of Graduate Programs*

C. G. Bowers Jr., *Undergraduate Coordinator*

**TEACHING, RESEARCH AND EXTENSION FACULTY**

*Distinguished University Professor and William Neal Reynolds Professor:* R. W. Skaggs; *Professors:* C. F. Abrams Jr., J. C. Barker, D. B. Beasley, R. W. Bottcher, C. J. Bowers Jr., F. J. Humenik, E. G. Humphries, W. H. Johnson, G. J. Kriz, W. F. McClure, R. E. Phillips, R. P. Rohrbach, A. R. Rubin, R. S. Sowell, L. F. Stikeleather, P. W. Westerman, T. B. Whitaker (USDA), D. H. Willits, J. H. Young; *Adjunct Professors:* F. E. Barton II, L. M. Safley Jr., S. S. Schiffman; *Professors Emeriti:* E. O. Beasley, G. B. Blum Jr., H. D. Bowen, J. W. Dickens, L. B. Driggers, J. M. Fore, G. W. Giles, E. L. Howell, F. M. Richardson, R. E. Sneed, C. W. Suggs, R. W. Watkins, E. H. Wiser; *Associate Professors:* G. R. Baughman, S. M. Blanchard, M. D. Boyette, R. L. Huffman, G. D. Jennings, J. E. Parsons; *Assistant Professors:* J.J. Classen, R. O. Evans, S. A. Hale; *Adjunct Assistant Professors:* D. D.Archibald, . L. Langley, S. K. Seymour; *Senior Researcher:* G. M. Chescheir, S. C. Mohapatra; *Extension Specialists:* S. W. Coffey, J. A. Gale, D. E. Line, R. L. McLymore, D. L. Osmond, J. M. Rice, R. E. Sheffield, R. L. Sherman, J. Spooner; *Associate Members of the Faculty:* B. E. Farkas (Food Science), A. E. Hassan (Forestry), T. M. Losordo (Zoology), S. C. Roe (CompanionAnimal & Special Species Medicine), K. R. Swartzel (Food Science).

The department offers a Bachelor of Science in Biological Engineering. Biological engineering "brings engineering to life". Students analyze and develop solutions to unique engineering problems of biological and agricultural systems. An area of concentration can be chosen whereby scientific and engineering principles are applied to diverse problems in a particular area. Examples of applications in areas of concentrations are biomechanical systems for biomedical applications; proper environmental management of soil and water resources; processing and marketing of food and fiber; and machines, controls, and structures for biological and agricultural systems.

## OPPORTUNITIES

Conceptualizing, designing, and developing systems for producing, processing and packaging a high quality food supply and maintaining a high quality environment will provide many opportunities for graduates of the biological engineering curriculum.

Jobs can be in design, development and research in public institutions and in industry. Examples are food engineers for food processing companies, biological engineers for biomedical companies, design engineers for agricultural equipment companies, and environmental engineers for government environmental agencies, industry or engineering consulting firms. This curriculum, accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), also provides adequate training for post-graduate work leading to advanced degrees in Biological and Agricultural Engineering.

## CURRICULUM

The curriculum provides an educational program for students which uniquely prepares them for dealing with engineering problems in the biological and agricultural areas. Flexibility in the program allows the student to choose electives which may lead to concentrations in the areas of biomedical engineering, environmental engineering, bioprocess engineering, agricultural engineering, or an emphasis area designed by the student and his/her advisor. Emphasis is placed on basic science and engineering courses such as mathematics, physics, chemistry, mechanics, biology, soils, and thermodynamics which provide a sound background for the application of engineering to biological problems.

The program is jointly administered by The College of Engineering and The College of Agriculture and Life Sciences in order to assure quality of basic training in both engineering and the life sciences. Undergraduate freshmen entering this curriculum should enroll in the College of Engineering undesignated program and indicate BEU as their curriculum choice. After successfully completing the Engineering undesignated requirements the student will enter the Biological and Agricultural Engineering Department (BE).

## WORLD WIDE WEB ADDRESS

The Biological and Agricultural Engineering Department may be viewed on the World Wide Web at the following URL: http://www2.ncsu.edu/bae

# CURRICULUM IN BIOLOGICAL ENGINEERING
## Degree earned: B.S. in Biological Engineering

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to COE | 0 |
| E 115 Intro. to Computing Environ | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Humanities/Soc.Sci. Elective [2] | 3 |
| Any 100-level PE in Fitness & Wellness [1] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 205 Physics for Engr. & Sci. I | 4 |
| Physical Education Elective | 1 |
| | 16 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BAE 101 Intro. to BAE & Computers | 3 |
| MAE 206 Engineering Statics or | |
| CE 214 Engineering Mechanics - Statics | 3 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| Humanities/Soc.Sci. Elective [2] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| BAE 202 Intro. to BAE Methods | 3 |
| BAE (BIO) 235 Engineering Biology | 3 |
| MAE 208 Engineering Dynamics or | |
| CE 215 Engineering Mechanics - Dynamics | 3 |
| MA 341 Applied Diff. Equations | 3 |
| MAE 301 Engineering Thermodyn., I | 3 |
| Physical Education Elective [1] | 1 |
| | 16 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BAE 402 Transport Phenomena | 3 |
| BAE Elective [3] | 3 |
| MAE 308 Fluid Mechanics | 3 |
| CH 220 Organic Chemistry [4] | 4 |
| Humanities/Soc.Sci. Elective [2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BAE 315 Properties of Bio. Engineering Materials | 3 |
| BAE Elective [3] | 3 |
| ECE 331 Princ. Electr. Engineering I | 3 |
| MAE 314 Solid Mechanics | 3 |
| Biol. Science Elective [5] | 3 |
| | 16 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BAE 401 Bioinstrumentation | 3 |
| BAE 451 Engineering Design I | 2 |
| Engineering Sci. Elective [6] | 3 |
| Ethics Elective [7] | 3 |
| Humanities/Soc.Sci. Elective [2] | 3 |
| Comm. Elective [8] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| BAE 452 Engineering Design II | 2 |
| Biol. Science Elective [5] | 3 |
| Biol. or Engineering Science Elective [5,6] | 3 |
| Humanities/Soc.Sci. Elective [2] | 3 |
| Humanities/Soc.Sci. Elective [2] | 3 |
| Physical Education Elective [1] | 1 |
| | 15 |

Total Hours Required for Graduation ..... 128 [9]

[1] Note: only two of the four credit hours listed for PE count toward credit hours required for graduation.
All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester).

AGRICULTURAL ENGINEERING CONCENTRATION
Requires SSC 200, BAE 361, 3 additional hrs. chosen from BAE group elective list, and 9 additional hrs. from lists of biological science and engineering electives. For graduation, 128 semester hours are required.

BIOMEDICAL ENGINEERING CONCENTRATION
Requires BAE 465, 3 additional hrs. chosen from BAE group elective list, and 9 additional hrs. from lists of biological science and engineering electives. For graduation, 128 semester hours are required.

BIOPROCESS ENGINEERING CONCENTRATION
Requires BAE 422, MB 351, FS 402, FS 421, 3 additional hrs. chosen from BAE group elective list, and 3 additional hrs. from list of engineering electives. For graduation, 128 semester hours are required.

ENVIRONMENTAL ENGINEERING CONCENTRATION
Requires SSC 200, BAE 471, BAE 472, either BAE 473 or BAE 578, 3 additional hrs. chosen from BAE group elective list, and 3 additional hrs. from list of biological science electives. For graduation, 128 semester hours are required.

List of BAE Elective Group Courses
BAE 361 Analytical Methods in Engineering Design
BAE 422 Intro. to Food Process Engineering
BAE 465 Biomedical Engineering Applications
BAE 471 Land Resources Environ. Engineering
BAE 481 Structures and Environment

# DEPARTMENT OF CHEMICAL ENGINEERING

Riddick Engineering Laboratories, Room 113

R. G. Carbonell, *Head of the Department*

B. D. Freeman, *Associate Head of the Department*

P. K. Kilpatrick, *Associate Head of the Department*

D. F. Ollis, *Director of Graduate Programs*

H. Winston, *Coordinator of Advising*

*Distinguished University Professor:* D. F. Ollis; *Camille Dreyfus Professor:* H. B. Hopfenberg; *Hoechst-Celanese Professors:* R. G. Carbonell, R. M. Felder, *Professors:* K. G. Bachmann, R. G. Carbonell, J. M. Desimone, P. S. Fedkiw, R. M. Felder, C. K. Hall, H. B. Hopfenberg, R. M. Kelly, P. K. Kilpatrick, D. C. Martin, D. F. Ollis, M. R. Overcash, G. W. Roberts, C. J. Setzer; *Adjunct Professor:* A. H. Wehe; *Professors Emeriti:* K. O. Beatty, J. K. Ferrell, D. B. Marsland, A. S. Michaels, V. T. Stannett; *Associate Professors:* C. M. Balik, B. D. Freeman, C. S. Grant, S. A. Khan, H. H. Lamb, P. K. Lim, S. W. Peretti, H. Winston; *Adjunct Associate Professors:* P. Schlosser, J. J. Spivey, J. L. Williams; *Assistant Professor:* G. N. Parsons, *Adjunct Assistant Professor:* R. T. Chern.

The sound management of material, environmental, and energy resources, taking into account natural and economic constraints, guides the performance of chemical

engineering practice. Chemical engineering education integrates design and analysis, science and technology, with communication skills developed through exposure to the humanities, and the social and economic sciences. Chemical engineering organizes these diverse skills into a coherent discipline uniquely suited to the needs of the chemical, biochemical, environmental, petroleum, plastics, textile, and pulp and paper industries.

## FACILITIES

Departmental teaching and research activities are based on the four floors comprising the east wing of the Riddick Engineering Laboratories. Equipment for studying the principles of fluid flow, heat transfer, distillation, absorption, and drying is maintained in several laboratories. Chemical reaction kinetics including heterogeneous catalysis and polymerization are studied on specially designed equipment. Extensive apparatus is available for characterizing the relationships between molecular structure and bulk properties of polymers. A 2,000 square foot biotechnology laboratory has been equipped to include a pilot plant for studying biologically mediated chemical reactions. Specialized digital computational equipment complements campus-wide university computer resources. The department makes constant use of the College of Engineering EOS computer system which is accessible for use 24 hours a day by students and faculty.

## OPPORTUNITIES

Graduates find employment at attractive salaries in diverse subdisciplines including research and development, production, management and administration; process control, technical service, and sales; estimation and specification writing; consulting and teaching. Students desiring careers in teaching, research, or consulting are advised to consider graduate training (consult the *Graduate Catalog*). Chemical engineering graduates often pursue careers in law or the medical sciences since the broadly structured undergraduate curriculum provides strong preparation for graduate study in a wide range of professional specialties.

## CURRICULA

The successful practice of chemical engineering requires a broad, diversified preparation. The spirit of research and experimental inquiry is vital; students, therefore, require sound scientific backgrounds essential to original and disciplined thought, enthusiastic inquiry and, ultimately, original and constructive accomplishment. The

undergraduate curriculum emphasizes the scientific, engineering, and economic principles involved in the design and operation of chemical processes.

Design methodologies are practiced in all core chemical engineering courses. This integrated design experience culminates with the senior design sequence, CHE 450 and CHE 451. The background in organic, physical, and inorganic chemistry is comparable to the training offered to chemistry majors. Mathematics, physical sciences, and distributed humanities courses are also required. The chemical engineering program, which is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), leads to the degree Bachelor of Science in Chemical Engineering.

## CURRICULUM IN CHEMICAL ENGINEERING
## Degree earned: B.S. in Chemical Engineering

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 101 General Chemistry I | 3 | CH 107 General Chemistry II | 3 |
| CH 121 General Chemistry I Lab | 1 | CH 127 General Chemistry II Lab | 1 |
| E 100 Intro. to COE | 0 | ENG 112 Comp. & Reading | 3 |
| E 115 Intro. to Computing Environ | 1 | MA 241 Analytic Geom. & Calculus II | 4 |
| ENG 111 Comp. & Rhetoric | 3 | PY 205 Physics Engr. & Sci. I | 4 |
| MA 141 Analytic Geom. & Calculus I | 4 | Physical Education Elective | 1 |
| Humanities/Soc.Sci. Elective | 3 | | 16 |
| Any 100-level PE in Fitness & Wellness | 1 | | |
| | 16 | | |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 221 Organic Chemistry I | 4 | CH 223 Organic Chemistry II | 4 |
| CHE 205 Chemical Proc. Prin. | 4 | CHE 225 Chemical Proc. Systems | 3 |
| MA 242 Analytic Geom. & Calculus III | 4 | MA 341 Applied Diff. Equations | 3 |
| Humanities/Soc.Sci. Elective | 3 | PY 208 Physics Engr. & Sci. II | 4 |
| Physical Education Elective | 1 | Humanities/Soc.Sci. Elective | 3 |
| | 16 | | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 315 Quantitative Analysis | 4 | Chemistry Elective | 4 |
| CHE 311 Transport Proc.. I | 3 | CHE 312 Transport Proc. II | 3 |
| CHE 315 Chemical Proc. Thermodyn.. | 3 | CHE 316 Thermodyn.of Chemical & Phase Equations | 3 |
| ECE 331 Prin. Electrical Engineering **or** | | CHE 330 CHE Lab I | 3 |
| MAT 201 Struct & Prop Engineering Materials | 3 | Humanities/Soc.Sci. Elective | 3 |
| ENG 331 Comm. for Engr. & Technology | 3 | | 16 |
| | 16 | | |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CHE 331 CHE Lab II | 2 |
| CHE 446 Des & Analysis Chemical Reactors | 3 |
| CHE 450 CHE Design I | 3 |
| Humanities/Soc. Sci. Elective | 3 |
| Technical Elective | 3 |
| Physical Education Elective | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CHE 425 Proc. System Analysis & Control | 3 |
| CHE 451 CHE Design II | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Technical Elective | 3 |
| | 15 |

Total Hours Required for Graduation ..... 125*

* Note: only two of the four credit hours listed for PE count toward credit hours required for graduation.
All students graduating from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester).

## BIOSCIENCES OPTION IN CHEMICAL ENGINEERING

By enhanced exposure to the biological sciences, the biosciences option in chemical engineering enables the student to develop insight into biological systems and processes.

## CURRICULUM IN CHEMICAL ENGINEERING, BIOSCIENCES OPTION
## Degree earned: B.S. in Chemical Engineering

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to COE | 0 |
| E 115 Intro. to Computing Environ | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 205 Physics Engr. & Sci. II | 4 |
| Physical Education Elective | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| CH 221 Organic Chemistry I | 4 |
| CHE 205 Chemical Proc. Prin. | 4 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| Physical Education Elective | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| CHE 225 Chemical Proc. Systems | 3 |
| MA 341 Applied Diff. Equations | 3 |
| PY 208 Physics Engr. & Sci. II | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BCH 451 Intro. Biochemistry | 4 |
| BCH 452 Biochemistry Lab | 2 |
| CHE 311 Transport Proc. I | 3 |
| CHE 315 Chemical Proc. Thermodyn.. | 3 |
| ECE 331 Prin. Electrical Engineering or | |
| MAT 201 Struct.& Props Engineering Materials | 3 |
| ENG 331 Comm. for Engr. & Technology | 3 |
| | 18 |

| *Spring Semester* | *Credits* |
|---|---|
| Bioscience Elective | 3 |
| CHE 312 Transport Proc. II | 3 |
| CHE 316 Thermodyn. of Chemi. & Phase Equations | 3 |
| CHE 330 Chemical Engineering Lab I | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CHE 331 Chemical Engineering Lab II | 2 |
| CHE 446 Des & Analysis Chemical Reactors | 3 |
| CHE 450 CHE Design I | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Physical Education Elective | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CHE 425 Proc. Systems Analysis & Control | 3 |
| CHE 451 CHE Design II | 3 |
| CHE 551 Biochemical Engineering | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 15 |

Total Hours Required for Graduation ..... 127*

* Note: only two of the four credit hours listed for PE count toward credit hours required for graduation.
All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester).

## ELECTRONIC MATERIALS OPTION IN CHEMICAL ENGINEERING

The electronic materials option in chemical engineering allows the student to develop an understanding of the scientific and technological principles associated with design and manufacture of computer chips and other microelectronics devices.

# CURRICULUM IN CHEMICAL ENGINEERING
# ELECTRONIC MATERIALS OPTION
## Degree earned: B.S. in Chemical Engineering

### FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 101 General Chemistry I | 3 | CH 107 Chemical Prin. & Applic. | 3 |
| CH 121 General Chemistry I Lab | 1 | CH 127 General Chemistry II Lab | 1 |
| E 100 Intro. to COE | 1 | ENG 112 Comp. & Reading | 3 |
| E 115 Intro. to Computing Environ. | 1 | MA 241 Analytic Geom. & Calculus II | 4 |
| ENG 111 Comp. & Rhetoric | 3 | PY 205 Physics Engr. & Sci. II | 4 |
| MA 147 Analytic Geom. & Calculus I | 4 | Physical Education Elective | 1 |
| Humanities/Soc.Sci. Elective | 3 | | 16 |
| Any 100-level PE in Fitness & Wellness | 1 | | |
| | 16 | | |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 201 Organic Chemistry I | 4 | CH 223 Organic Chemistry II | 4 |
| CHE 205 Chemical Proc. Prin. | 4 | CHE 225 Chemical Proc. Systems | 3 |
| MA 242 Analytic Geom. & Calculus III | 4 | MA 341 Applied Diff. Equations | 3 |
| PY 208 Physics Engr. & Sci. II | 4 | MAT 201 Struct & Props Engineering Materials | 3 |
| Physical Education Elective | 1 | Humanities/Soc.Sci. Elective | 3 |
| | 17 | Physical Education Elective | 1 |
| | | | 17 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 315 Quantitative Analysis | 4 | CH 457 Physical Chem for Engr. | 4 |
| CHE 301 Transport Proc. I | 3 | CHE 302 Transport Proc. II | 3 |
| CHE 315 Chemical Proc. Thermodyn. | 3 | CHE 316 Thermodyn. of Chemical & Phase Equations | 3 |
| ENG 331 Comm. for Engr. & Technology | 3 | CHE 330 Chemical Engineering Lab I | 3 |
| Humanities/Soc.Sci. Elective | 3 | MAT 331 Electronic Prop. of Materials | 3 |
| | 16 | MAT 333 Electronic Prop. Lab | 1 |
| | | | 17 |

### SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CHE 331 Chemical Engineering Lab II | 2 | CHE 425 Proc. Systems Analysis & Control | 3 |
| CHE 446 Des & Analysis Chemical Reactors | 3 | CHE 451 CHE Design II | 3 |
| CHE 450 CHE Design I | 3 | CHE 460 Chemical Proc. of Elec. Materials | 3 |
| Electronic Materials Elective | 3 | Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 | Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 | | 15 |
| | 17 | | |

Total Hours Required for Graduation 129*

* Note: only two of the four credit hours listed for PE count toward credit hours required for graduation.
All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level

## MINOR IN CHEMICAL ENGINEERING

In addition to B.S. graduates of the chemical engineering program at NC State, there is a pool of students in other disciplines whose professional work assignments may require a knowledge of chemical engineering nomenclature, technologies and methods. The minor in chemical engineering is intended to allow such students to develop an understanding of the fundamental concepts and practice of chemical engineering. This minor should be most attractive to undergraduate students in environmental engineering, pulp and paper technology, and chemistry, and it will allow non-chemical engineering majors to prepare themselves for graduate study in chemical engineering with a minimum amount of prerequisite work following their acceptance into the graduate program.

Students enrolled in the minor in chemical engineering must complete CHE 205, CHE 225, CHE 311, CHE 315, CHE 316, and CHE 446. All the courses must be completed with a grade of C – or higher.

An application for the minor must be submitted to the Coordinator of Advising in the Department of Chemical Engineering. Admission to the minor will require a minimum 2.500 over-all grade point average at NC State, and a grade of B- or higher on the first enrollment in CHE 205.

# DEPARTMENT OF CIVIL ENGINEERING

Mann Hall, Room 203

E. Downey Brill Jr., *Head*

H.E.Wahls, *Associate Head for Graduate Programs*

J.S.Fisher, *Associate Head*

W.L.Bingham, *Coordinator of Advising*

*Civil Engineering Distinguished Professor:* J. M. Hanson: *Professors*: S. H Ahmad, E. D. Brill Jr., R. H. Borden, J. S. Fisher, C. G.Gilbert, A. K. Gupta, J. M. Hanson, K. S. Havner, Y. Horie, D. W. Johnston, N. P. Khosla, W. J. Rasdorf, N. M. Rouphail, C. C. Tung, H. E. Wahls; *Adjunct Professor:* R. H. Reckhow; *Distinguished University Professor Emeritus:* P. Z. Zia; *Professors Emeriti*:: M. Amein, P. D. Cribbins, R. A. Douglas, J. F. Ely, R. E. Fadum, C. L. Heimbach, J. W. Horn, A. I. Kashef, C. L. Mann Jr., P. H. McDonald, M. E. Uyanik; *Associate Professors:* M. A. Barlaz, J. W. Baugh Jr., L. E. Bernold, W. L. Bingham, R. C. Borden, A. C. Chao, E. D. Gurley, J. E. Hummer, Y. R. Kim, P. C. Lambe, H. R. Malcom, V. C. Matzen, J. M. Nau, M. F. Overton, M. S. Rahman, J. C. Smith, J. R. Stone; *Associate Professor Emeritus:* G. R. Taylor; *Assistant Professors:* H. C. Frey, T. Hassan, D. R. U. Knappe, N. Krstulovic-Opara, M. L. Leming, S. K. Liehr, S. R. Ranjithan, A. A. Tayebali; *Adjunct Assistant Professors:* J. C. Brantley, III, L. R. Goode, D. R. Van der Vaart, J. S. Wu; *Lecturer:* D. J. Lombardi; *Lecturer and Senior Construction*

*Extension Specialist:* P.P.McCain; *Adjunct Lecturers*: R. F. DeBruhl, B. A. Doll, B.E. Matthews; Senior Extension Specialist: S.M. Rogers Jr.

The Department of Civil Engineering offers several degree programs concerned with the improvement and care of the built and natural environments and dealing with planning, design, construction, operation, and maintenance of buildings, dams, bridges, harbors, power facilities, pollution control facilities, water supply, and transportation systems. The curricula provide academic preparation for students considering a career in civil, construction, or environmental engineering.

The department offers undergraduate degree programs leading to the Bachelor of Science in Civil Engineering, the Bachelor of Science in Construction Engineering and Management, and the Bachelor of Science in Environmental Engineering. All three programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). Graduation from an ABET accredited engineering degree is the first step toward registration as a Professional Engineer.

## OPPORTUNITIES

People will always need constructed facilities to live, work , and sustain their lives and environment, and civil, construction, and environmental engineers will always be needed to plan, design, and construct these facilities. Civil, construction, and environmental engineering comprises such a diversified field that graduates have a wide choice in locations and type of employment. Jobs range from federal, state, or municipal agencies to a variety of manufacturing and processing industries, consulting firms or construction companies. The work may be performed partially or wholly in an office or in the field and may be located in a small community, a large industry center or in a foreign country. Careers in either professional practice or teaching and research are common for many graduates who complete advanced degrees.

## FACILITIES

Open access is available to a state-of-the-art computer laboratory providing support in analysis, design-synthesis, and word processing. Laboratories for testing construction materials, large models or full-scale structures; for the investigation of geotechnical materials; for hydraulic experiments; for analysis of small structural models; for chemical and biological tests pertaining to environmental engineering;

for construction surveys; for construction process modeling, management, and automation; and for the investigation of transportation problems all help students learn more about their field.

## CURRICULA

The objective of each of the three curricula is to prepare the graduate for a career in the respective field and for lifelong learning through graduate education, continuing education, and/or self study.

The Civil Engineering curriculum is designed to provide academic discipline in mathematics, the physical sciences, the humanities and social sciences, and the technical aspects of civil engineering. After introductory exposure to several of the professional areas such as environmental and water resources, geotechnical, structures, and transportation engineering, the student builds additional depth in one of these specialties.

The curriculum in Construction Engineering and Management is designed for the students interested in the planning, design, direction, and management of construction projects. It includes the core course requirements in mathematics, the physical sciences, and the humanities and social sciences. After exposure to engineering fundamentals and engineering design of facilities, the curriculum provides a series of specialty courses in construction engineering related to the analysis, design, and management of the construction process. Two concentrations are available: General Construction for those interested in building, bridge, roadway, utility, residential, and related types of facilities and Mechanical Construction for those interested in building mechanical or industrial process systems.

The curriculum in Environmental Engineering is designed for students interested in environmental protection. The curriculum provides students with basic knowledge of the chemical, biological and physical processes that govern the transport and fate of pollutants in the environment as well as the design of engineered systems. On graduation, students are prepared to work in the areas of water and wastewater treatment, air pollution control, solid waste management, and hydrology and water resources. The curriculum emphasizes the interdisciplinary nature of environmental engineering with courses in both engineering and life sciences, including specialized courses on pollution control and waste management.

## POST-BACCALAUREATE STUDY

If a student is interested in more intense specialization in one particular area, advanced level training is available leading to a Professional Degree in civil engineering, the Master of Civil Engineering, the Master of Science or the Doctor of Philosophy. Specialization areas include coastal and ocean engineering, construction engineering and management, construction materials, environmental and water resources engineering, geotechnical engineering, mechanics and structural engineering and transportation engineering. With judicial choice of electives, a student may also prepare for additional study in law, business administration, business management and city and regional planning.

## STUDENT ACTIVITIES AND SCHOLARSHIPS

Student chapters of the American Society of Civil Engineers, Associated General Contractors, National Association of Home Builders, Institute of Transportation Engineers, and Air and Waste Management Association undertake projects to further student exposure to the profession and invite guest speakers from industry and government. Students who accumulate outstanding academic records may be considered for membership in the Chi Epsilon Honorary Society. Through the generosity of industry and program alumni, many scholarships are available on a competitive basis to students in addition to university, college and need-based financial aid.

## CURRICULUM IN CIVIL ENGINEERING

### Degree earned: B.S. in Civil Engineering

*For students entering after June 1993*

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to COE | 0 |
| E 115 Intro. to Computing Environ | 1 |
| EC 201 Economics (H&SS Elective I) | 3 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Any 100-level PE in Fitness & Wellness [5] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 110 Intro. to Computing - PASCAL **or** | |
| CSC 112 Intro. to Computing - FORTRAN **or** | |
| CSC 114 Intro. to Computing - C++ | 3 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 205 Physics for Engr. & Sci. I | 4 |
| Physical Education Elective | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CE 214 Engineering Mechanics- Statics | 3 |
| GC 101 Engineering Graphics I | 2 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| Humanities/Soc.Sci. Elective [1](H&SS Elect 2) | 3 |
| Physical Education Elective | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CE 215 Engineering Mechanics- Dynamics | 3 |
| CE 313 Mechanics of Solids | 3 |
| MA 341 Applied Diff. Equations I | 3 |
| MAT 200 Mechanical Prop of Structural Materials | 3 |
| Humanities/Soc.Sci. Elective [1] (H&SS Elect 3) | 3 |
| Physical Education Elective | 1 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CE 305 Traffic Engineering | 3 |
| CE 324 Structural Behavior Meas | 1 |
| CE 325 Structural Analysis | 3 |
| CE 332 Materials of Construction | 3 |
| CE 381 Hydraulics Systems. Measure Lab | 1 |
| CE 382 Hydraulics | 3 |
| Humanities/Soc.Sci. Elective [1] (H&SS Elect 4) | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CE 327 Reinforced Concrete Design | 3 |
| CE 342 Engineering Behavior Soils & Foundations | 4 |
| CE 375 Civil Engineering Systems | 3 |
| CE 383 Hydrology & Urban Water Systems **or** | |
| CE 384 Intro. Environ. Engineering | 3 |
| Basic Science Elective [2] | 4 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CE Design Elective I [4] | 3 |
| COM 110 Public Speaking **or** | |
| ENG 331 Comm. for Engr. & Technology | 3 |
| ECE 331 Prin. Electrical Engineering I **or** | |
| MAE 301 Engineering Thermodyn.. I | 3 |
| Humanities/Soc.Sci. Elective 1(H&SS Elect 5) | 3 |
| | 12 |

| *Spring Semester* | *Credits* |
|---|---|
| CE Design Elective | 3 |
| Engineering Science Elective | 3 |
| Humanities/Soc.Sci. Elective [1] (H&SS Elec 6) | 3 |
| Humanities/Soc.Sci. Elective [1] (H&SS Elec 7) | 3 |
| | 12 |

Total Hours Required for Graduation ..... 120 *

* Note: only two of the four credit hours listed for PE count toward credit hours required for graduation.

•Foreign language proficiency at the FL_102 level will be required for graduation for all students admitted as freshmen or transfer students beginning the summer and fall of 1994.

[1] Humanities & Social Science Courses to be selected from the appropriate list approved by the College of Engineering

[2] Basic science elective. Select one: BIO 125, CH 107 & CH 127 or MEA 101 & MEA 110.

[3] Engineering science electives to be selected from the approved list.

[4] Design electives to be selected from the approved list.

# CURRICULUM IN CONSTRUCTION ENGINEERING AND MANAGEMENT
## General Construction Concentration
## Degree earned: B.S. in Construction Engineering and Management

*For students entering after June 1996*

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to College of Engineering | 0 |
| E 115 Intro. to Computing Environ | 1 |
| EC 201 Economics I[1] (H7SS Elec.1) | 3 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Any 100-level PE in Fitness&Wellness [3] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 112 Intro. to Computing - FORTRAN **or** | |
| CSC 114 Intro. to Computing - C++ | 3 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom.& Calculus II | 4 |
| PY 205 Physics Engr. & Sci. I | 4 |
| Physical Education Elective | 1 |
| | 15 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CE 214 Engineering Mechanics - Statics | 3 |
| EC 301 Microeconomics[1](H&SS Elec. 2) | 3 |
| GC 101 Engineering Graphics I | 2 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| Physical Education Elective | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CE 200 Civil Engineering Meas. & Surveys | 3 |
| CE 215 Engineering Mechanics - Dynamics | 3 |
| CE 313 Mechanics of Solids | 3 |
| MAT 200 Mech Prop. of Structural Materials | 3 |
| ST 370 Probability and Statistics for Engr.. | 3 |
| Physical Education Elective | 1 |
| | 17 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CE 325 Structural Analysis | 3 |
| CE 332 Materials of Construction | 3 |
| CE 324 Structural Behavior Meas. **or** | |
| CE 381 Hydraulics Systems. Meas. Lab. | 1 |
| CE 382 Hydraulics | 3 |
| CE 463 Construction Estim. Planning & Control | 3 |
| COM 146 Business & Prof. Comm. **or** | |
| ENG 331 Comm. for Engr. & Technology | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CE 327 Reinforced Concrete Design | 3 |
| CE 342 Engineering Behavior of Soils & Foundations | 4 |
| CE 305 Traffic Engineering **or** | |
| CE 367 Mech & Elec. Systems in Buildings **or** | |
| CE 383 Hydrology & Urban Water Systems. | 3 |
| CE 465 Construction Equipment & Methods | 3 |
| Basic Science Elective[2] | 4 |
| | 17 |

### SENIOR YEAR

| *Semester* | *Credits* |
|---|---|
| CE 426 Structural Steel Design | 3 |
| CE 464 Legal Aspects of Contracting | 3 |
| CE 466 Building Construction Engineering | 3 |
| ECE 331 Prin. Of Electrical Engineering I **or** | |
| MAE 301 Engineering Thermodyn. I | 3 |
| Humanities/Soc. Sci. Elective[1] (H&SS Elec. 3) | 3 |
| Humanities/Soc. Sci. Elective[1] (H&SS Elec. 4) | 3 |
| | 18 |

| *Semester* | *Credits* |
|---|---|
| ACC 280 Managerial Accounting **or** | |
| BUS 350 Human Res. Mgmt. | 3 |
| CE 469 Construction Engineering Project | 3 |
| Humanities/Soc. Sci. Elective[1] (H&SS Elec. 6) | 3 |
| Humanities/Soc. Sci. Elective[1] (H&SS Elec. 7) | 3 |
| Humanities/Soc. Sci. Elective[1] (H&SS Elec. 8) | 3 |
| | 15 |

Minimum Credit Hours Required for Graduation [3] ..... 128

1. Humanities and Social Science courses to be selected from the appropriate list approved by the College of Engineering.
2. Basic science elective select one: BIO 125, CH 107 & CH 127, or MEA 101 & MEA 110
3. The first two PE credits do not count toward the minimum credit hours for graduation.
*Foreign language proficiency at the FL 102 level will be required for graduation for all students admitted as freshmen or transfer students beginning the summer and fall of 1994.

## CURRICULUM IN CONSTRUCTION ENGINEERING AND MANAGEMENT
## Mechanical Construction Concentration
## Degree earned: B.S. in Construction Engineering and Management

*For students entering after June 1995*

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to COE | 0 |
| E 115 Intro. to Computing Environ | 1 |
| EC 201 Economics I[1](H&SS Elec. 1) | 3 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| | 15 |
| Any 100-level PE Fitness & Wellness [4] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 110 Intro. to Computing-FORTRAN or | |
| CSC 112 Intro. to Computing - C++ | 3 |
| ENG 112 Comp. and Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 205 Physics Engr. & Sci. I | 4 |
| Physical Education Elective | 1 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CE 214 Engineering Mechanics - Statics | 3 |
| EC 301 Microeconomics[1] (H&SS Elec. 2) | 3 |
| GC 101 Engineering Graphics I | 2 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| Physical Education Elective | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CE 215 Engineering Mechanics-Dynamics | 3 |
| CE 313 Mechanics of Solids | 3 |
| MAT 200 Mechanical Prop. of Structural Materials | 3 |
| ST 370 Probability and Statistics for Engr. | 3 |
| Humanities/Soc. Sci. Elective[1] (H&SS Elec.3) | 3 |
| Physical Education Elective | 1 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CE 382 Hydraulics | 3 |
| CE 463 Construction. Estim. Planning & Control | 3 |
| COM 146 Business & Prof. Comm. or | |
| ENG 331 Comm. Engr. & Technology | 3 |
| MAE 301 Engineering Thermodyn.. I | 3 |
| MAE 305 ME Lab I | 1 |
| MAE 316 Strength of Mechanical Components | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CE 367 Mechanical & Elec. Systems. in Buildings | 3 |
| CE 465 Construction Equipment & Methods | 3 |
| ECE 331 Prin. of Electrical Engineering I | 3 |
| ECE 339 Prin. of Electrical Engineering Lab | 1 |
| MAE 310 Conduction & Radiation Heat Transfer | 3 |
| Basic Science Elective[2] | 4 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CE 464 Legal Aspects of Contracting | 3 |
| MAE 403 Air Conditioning & Refrigeration | 3 |
| MAE 406 Energy Conservation in Industry | 3 |
| Mechanical Engineering Elective[3] | 3 |
| Humanities/Soc. Sci. Elective[1] (H&SS Elec. 4) | 3 |
| Humanities/Soc. Sci. Elective[1] (H&SS Elec. 5) | 3 |
| | 18 |

| *Spring Semester* | *Credits* |
|---|---|
| ACC 280 Managerial Accounting or | |
| BUS 330 Human Res. Mgmt. | 3 |
| CE 469 Construction Engineering Project | 3 |
| MAE 421 Prin. of Solar Engineering | 3 |
| Humanities/Soc. Sci. Elective[1] (H&SS Elec.6) | 3 |
| Humanities/Soc. Sci. Elective[1] (H&SS Elec.7) | 3 |
| | 15 |

Minimum Credit Hours Required for Graduation[3] ..... 128

1. Humanities and Social Science courses to be selected from the appropriate list approved by the College of Engineering.
2. Basic science elective Select one: BIO 125, CH 107 & CH 127, or MEA 101 & MEA 110.
3. Mechanical Engineering Elective: Select one: MAE 302, 407, 408 or 411
4. The first two PE credits do not count toward the minimum credit hours for graduation.

Foreign language proficiency at the FL 102 level will be required for graduation for all students admitted as freshmen or transfer students beginning the summer and fall of 1994

## CURRICULUM IN ENVIRONMENTAL ENGINEERING
## Degree earned: B.S. in Environmental Engineering

*For students entering after June 1996*

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to COE | 0 |
| E 115 Intro. to Computing Environ | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| EC 201 Economics I (H & SS Elec.) | 3 |
| Any 100-level PE in Fitness & Wellness[3] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom.& Calculus II | 4 |
| PY 205 Physics for Engr. &Sci. I | 4 |
| Physical Education Elective[3] | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CE 214 Engineering Mechanics -Statics | 3 |
| CH 221 Organic Chemistry I or | |
| CH 220 Intro. Organic Chemistry | 4 |
| CHE 205 Chemical Proc. Prin. | 4 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| Humanities/Soc.Sci. Elective[1] | 3 |
| | 18 |

| *Spring Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| CE 215 Engineering Mechanics - Dynamics | 3 |
| CE 280 Prin. of Environ. Engineering | 3 |
| CHE 225 Chemical Proc. Systems | 3 |
| MA 341 Applied Diff. Equations I | 3 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CE 374 Environ. Engineering Lab | 2 |
| CE 382 Hydraulics | 3 |
| COM 110 Public Speaking **or** | |
| ENG 331 Comm. for Engr. & Technology | 3 |
| CSC 110 Intro. to Computing - PASCAL **or** | |
| CSC 112 Intro. to Computing - FORTRAN **or** | |
| CSC 114 Intro. to Computing - C ++ | 3 |
| PY 208 Physcis for Enginrs. & Sci. II | 4 |
| Physical Education Elective [3] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CE 313 Mechanics of Solids | 3 |
| CE 375 Civil Engineering Systems | 3 |
| CE 381 Hydraulics Systems Meas. Lab | 1 |
| CE 470 Physical Proc. of Envir. Enginr | 3 |
| MAE 301 Engineering Thermodyn... I **or** | 3 |
| CHE 315 Chemical Proc. Thermodyn.. | 3 |
| Humanities/Soc.Sci. Elective [1] | 3 |
| | 19 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CE 383 Hydro & Urban Water Systems | 3 |
| CE 484 Water Supply & Waste Water Systems | 3 |
| ST 361 Intro. Statistics for Engineers** | 3 |
| Environ. Engineering Elective [2] | 3 |
| Humanities/Soc.Sci. Elective* | 3 |
| Physical Education Elective [2] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CE 342 Engineering Behavior of Soils | 4 |
| CE 481 Environ. Enginr. Project | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective [2] | 3 |
| | 16 |

Total Hours Required for Graduation ..... 128

[1] Humanities & Social Science Courses to be selected from the appropriate list approved by the College of Engineering
[2] Environ. Engineering Elective : CE 476 (Fall only) or CE 477 (Spring only)
[3] The first two PE credits do not count toward the minimum credit hours for graduation
Foreign language proficiency at the FL_102 level will be required for graduation for all students.

# DEPARTMENT OF COMPUTER SCIENCE

Withers Hall, Rooms 208 and 226

A. L. Tharp, *Head*

W.G. Scott Jr., *Assistant Head*

E.W. Davis Jr., *Director of Undergraduate Programs*

J.Hatch, *Coordinator of Advising*

R.A. Dwyer, *Director of Graduate Programs*

*Distinguished University Research Professor:* D.L.Bitzer; *Alumni Distinguished Undergraduate Professor*: A.L. Tharp; *Professor Emeritus:* D.C. Martin; *Professors:* D.L. Bitzer, W. Chou, R.J.Fornaro, R.E. Funderlic, D.F. McAllister, H.G. Perros, W.E.Robbins, C.D. Savage, W.J. Stewart, K.C. Tai, A.L. Tharp, M.A. Vouk; *Associate Professors:* D.R. Bahler, W.R. Cleveland II, E. W.Davis Jr., R.A.Dwyer, E.F. Gehringer, T.L.Honeycutt, S.P. Iyer, D.S. Reeves, R.D.Rodman, M.F. Stallmann; *Assistant Professors:* V.E. Jones, J.C. Lester, J.G. Rossie Jr., G.N. Rouskas, M.P.Singh, R.A.St.Amant, S.F.Wu; *Visiting Research Professor*: Franc Brglez; *Adjunct Professor:* R.J. Plemmons; *Adjunct Associate Professor*: K.D. Clark; *Adjunct Assistant Professors:* G.Q.Kenney, J.Mauney, R.A.O'Connor, M. Singh, D. Strickland, K.J.Ulberg, A.O.Zaghloul; *Lecturers:* J.Hatch,

T.E.Nelson, C.S.Miller, J.E.Perry, W.G.Scott Jr., *Adjunct Lecturers*: D.A.Lasher, W.D. Ruchte, S.G. Worth III; *Adjunct Instructor:* M.A. O'Connell; *Research Assistant*: R.L. Klevans; *Associate Members of the Department*: D.P. Agrawal(Electrical and Computer Engineering), J.W. Baugh Jr., (Civil Engineering), E.Kaltofen (Mathematics), C.D. Meyer Jr. (Mathematics), J.S. Scoggs (Mathematics), W.E. Snyder (Electrical and Computer Engineering), I. Viniotis (Electrical and Computer Engineering).

Computers and computing are ubiquitous in modern society. The discipline of computer science has evolved during the past three decades with the expanding role of computers. New applications of computers continue to appear. They are used to design, manufacture and operate our automobiles, airplanes and spacecraft; to design our highways, bridges and buildings; to manage banking transactions; to help managers make decisions; to analyze farm production; to help the research scientist; and to monitor manufacturing processes, utilities and communication. Computer science is an essential technology for the information superhighway and information services that will lead the economy into the 21st Century.

## OPPORTUNITIES

Computer scientists have many career choices because of the diversity of computer use. A graduate may be involved in the design, implementation, or management of computer systems. Some may work more with advancing computer capabilities while others may adapt computers to new applications. Others may pursue advanced study. Some may wish to interact frequently with people, while others may not. For whatever your ambitions and preferences, computer science offers opportunities.

## HONORS PROGRAM

The Undergraduate Honors Program aims to enhance the academic experience of gifted Computer Science undergraduate students. This is accomplished by working with faculty on research projects, enrolling in advanced and/or specialized courses, and interacting with other outstanding students. These requirements can also be used to fulfill the university and department requirements for graduation; the total number of courses required for graduation is not increased by participation in the Honors Program.

Promising students with a GPA of 3.500 or better are nominated by the faculty and invited to join the Honors Program. Graduates are recognized at graduation, and on their diploma and transcript, as having successfully fulfilled the special requirements of the Honors Program.

## CURRICULUM

This undergraduate curriculum leads to the degree of Bachelor of Science in Computer Science. This program is accredited by the Computer Science Accreditation Commission of the Computing Sciences Accreditation Board, a specialized accrediting body recognized by the Council on Postsecondary Accreditation and the U.S. Department of Education. Core courses provide the fundamentals of programming concepts, computer science theory, data structures, computer organization, operating systems, and software engineering. Restricted electives, chosen in consultation with one's advisor during the junior year, allow exploration of specific computer science subareas such as database management systems, operating systems, graphics, multimedia technology, artificial intelligence, networks and World Wide Web topics, computer-human interfaces and architecture. Students in another department may select courses in computer science as electives to broaden their programs of study and to learn how to use the computer for solving problems. Computer Science is currently accepting students with a grade point average of 2.700 or higher for matriculation or transfer.

## CURRICULUM IN COMPUTER SCIENCE
### Degree earned: B.S. in Computer Science

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 4 |
| E 100 Intro. to COE | 0 |
| E 115 Intro. to Computing Environ | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 114 Intro. to Computing - C++ | 3 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 205 General Physics I | 4 |
| Physical Education Elective | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CSC 210 Prog.. Lang Concepts | 3 |
| CSC 222 Applic. Discrete Math | 3 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| PY 208 General Physics II | 4 |
| Physical Education Elective | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 201 Computing Org & Assem Lang | 3 |
| CSC 311 Data Structures | 3 |
| MA 305 Intro. to Linear Algebra | 3 |
| Humanities/Soc. Sci. Elective | 3 |
| Basic Science Elective | 3 |
| | 15 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CSC 202 Operating Systems | 3 |
| CSC 333 Automata Theory or | 3 |
| CSC 302 Intro. to Numerical Methods | 3 |
| CSC Restricted Elective | 3 |
| ENG 331 Comm. for Engr. & Technology | 3 |
| Humanities/Soc.Sci. Elective | 1 |
| Physical Education Elective | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 310 Software Engineering | 3 |
| CSC Restricted Elective | 3 |
| EC 201 Economics I | 3 |
| ST 371 Intro. to Probability | 3 |
| Restricted Elective | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CSC Restricted Elective | 3 |
| CSC Project Course | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Restricted Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 379 Ethical Implic of Computing | 1 |
| CSC Restricted Elective | 3 |
| CSC Restricted Elective | 3 |
| Restricted Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Free Elective | 2 |
| | 15 |

Total Hours Required for Graduation ..... 120 *

* Note: only two of the four credit hours listed for PE count toward credit hours required for graduation.
All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester).

## MINOR IN COMPUTER PROGRAMMING

The Department of Computer Science offers a Minor in Computer Programming to undergraduate majors in any field except computer science and computer engineering. Undergraduates will be admitted to the Minor only if they have an overall GPA of at least 2.250. The Minor consists of the completion with a grade of C or higher of E 115 (S/U grading), CSC 114, 201, 202, 210, 222, 311, and MA 121 (or any college calculus course). At least five of these eight courses must be taken at NC State.

# DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Daniels Hall, Room 232

J. R. Hauser, *Interim Head*

J. J. Brickley Jr., *Associate Head*

J. W. Mink, *Graduate Coordinator*

W. D. Allen, *Coordinator of Advising*

*University Professor* J. R. Hauser; *Alumni Distinguished Undergraduate Professor:* M. A. Little john; *Alumni Distinguished Graduate Professor:* J. B. O'Neal Jr.; *Professors*: D. P. Agrawal, W. E. Alexander, B. J. Baliga, S. M. Bedair, R. K. Cavin III, W. Chou, T. H. Glisson, J. J. Grainger, J. F. Kauffman, R. M. Kolbas, M. A. Littlejohn, R. C. Luo, N. A. Masnari, N. F. J. Matthews, L. K. Monteith, H. T. Nagle Jr., A. A. Nilsson, J. B. O'Neal Jr., C. M. Osburn, S.A. Rajala, A. Reisman, W. E. Snyder, H. J. Trussell, J. J. Wortman; *Visiting Professor:* G. W. Rubloff; *Visiting Research Professor:* F. Brglez; *Adjunct Professors:* R. C. Eberhart, J. W. Gault, H. L. Grubin, W. C. Holton, G. J. Iafrate, R. B. Kelley, J. W. Keyes Jr., M. A. Stroscio, R. J. Trew, R. Tsu, R. L. Witcofski; *Professors Emeriti:* W. J. Barclay, A. R. Eckles, A. J. Goetze, G. B. Hoadley, D. R. Rhodes, A. VanderLugt, F. J. Tischer; *Associate Professors*: S. T. Alexander, G. L. Bilbao, M. Y. Chow, P. D. Franz on, E. F. Gehringer, R. S. Gyurcsik, A. W. Kelley, K. W. Kim, W. T. Liu, T. K. Miller III, M. C. Ozturk, D. S. Reeves, M. B. Steer, J. K. Townsend, I. Viniotis, M. W. White; *Adjunct Associate Professors*: J. R. Burke, J. A. Hutchby, S. H. Lee, H. L. Martin, J. J. Paulos; *Associate Professors Emeriti:*: W. T. Easter, E. G. Manning, W. C. Peterson; *Assistant Professors:* M. E. Baran, A. Duel-Hallen, C. S. Gloster Jr., P. K. McLarty; *Adjunct Assistant Professors:* C. Aras, D. L. Dreifus, M. J. Gorman, C. A. Hamilton, D. J. C. Herr, D. W. Hislop, T. H. Hubing, A. Kshemkalyani, R. O. Onvural, A. J. Rindos III, P. Santago III, C. K. Williams; *Assistant Professor Emeritus*: L. R. Herman; *Lecturers*: W. D. Allen, R. T. Kuehn; *Adjunct Lecturer*: C. E. Branscomb; *Research Associates:* R. Hamaker, J. He, A. M. Jungreis, F. G. McIntosh, N. S. Monsour, J. C. Roberts, V. Sankaran, D. Zhang; *Research Assistants:* E. S. Condon, J. M. O'Sullivan; *Associate Members of the Department:* D. Bitzer (Computer Science), E. Davis, (Computer Science), S. Khorram (Forestry), G. Lucovsky (Physics), J. Narayan (Materials Science and Engineering), H. Perros (Computer Science), W. Robbins (Computer Science), J. F. Schetzina (Physics), M. Stallman (Computer Science), M. Vouk (Computer Science).

The professions of electrical engineering and computer engineering are concerned with the analysis, design, construction and testing of systems based on electrical phenomena. In contemporary technological society, electrical methods are used to communicate and store information, control equipment and systems, perform mathematical operations, and convert energy from one form to another.

Frequently, two or more of these functions are important in the design of systems such as television, radio, telecommunications, computers, robots and intelligent machines, telemetry systems, solid-state electronics, biomedical devices, environmental controls, electric machinery, and electric power generation and transmission facilities.

Computer engineering is a field in which digital techniques are used in system design. Low-cost solid state microprocessors and memories permit computers to be

widely incorporated in many different types of electronic systems. To work effectively in this rapidly growing field, the computer engineer must understand both hardware and software techniques and must effectively use both techniques in order to design, build and test complex digital systems.

Both the electrical engineering and the computer engineering programs, which lead respectively to the degrees, Bachelor of Science in Electrical Engineering and Bachelor of Science in Computer Engineering, are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

## SCHOLARSHIPS AND AWARDS

Superior academic performance is recognized within this department in three ways: election of students to membership in the electrical engineering honor society, Eta Kappa Nu; awarding of merit scholarships; and presentation of awards to outstanding seniors. The department has one endowed merit scholarship for entering freshmen, the Eugene C. and Winifred Sakshaug Scholarship, and eight endowed scholarships which are usually awarded to juniors and seniors: Elizabeth P. Cockrell, L. A. Mahler, Amelia N. Mitta, Frank T. Pankotay, William DeRosset Scott III, E. Chester Seewald, North Carolina Electric Membership Corporation, and William D. Stevenson Jr., the latter two of which are for students studying electric power systems. The department also from time to time has scholarships provided by industrial organizations such as the Alcoa Foundation, General Motors Corporation and United Technologies Research Center. Academic merit is generally the primary requirement for these awards, but other characteristics, such as demonstrated leadership, may also be specified. In addition, the endowed William M. Cates Scholarship Program provides multiple scholarships for students having documented financial need and high academic performance. These are awarded each fall to juniors, with provision for continuation in the senior year.

## FACILITIES

Many courses are accompanied by coordinated laboratory work and projects. These assignments typically focus on real-world systems and problems and involve computer simulation and analysis, design, development and testing of hardware and software associated with electrical, electronic, and electromechanical systems, circuits and devices. Extensive facilities are provided for experimental study of analog and digital circuits, microprocessors, computers, electrical machinery, VLSI

devices, robots and intelligent machines, telecommunications, and microwave systems. The EOS System, a network of state-of-the-art engineering workstations, provides a powerful computing environment available to all students. Two EOS laboratories with more than sixty workstations, mostly color, are located within the department. Electrical and Computer Engineering provides knowledgeable attendants in these laboratories up to eighteen hours a day. A student may log in at over 500 workstations located in these two laboratories and several other facilities throughout the College of Engineering. Powerful software is provided on the system for engineering analysis, design and testing, symbolic mathematics, sophisticated color graphics, scientific spreadsheets, programming languages, word processing, document formatting and other special applications. The department has an Undergraduate Design Center which provides resources for required industry-sponsored, semester-long design projects. Weekly sessions are scheduled in the Undergraduate Teaching Center by teaching assistants to answer student questions about course material. Both centers are equipped with EOS workstations.

## CORE COURSES

The electrical and computer engineering curricula share core courses comprising a substantial portion of the first three years of study. Strong emphasis is placed on fundamental concepts in core courses so that graduates are prepared for rapid technological changes common in the electrical and computer engineering professions. A comprehensive foundation in mathematics and the physical sciences in the freshman year is followed in subsequent years by additional core courses in mathematics, physics, electric circuit theory, digital logic, computer systems, electronics, linear systems, and mechanics. Laboratory work is designed to demonstrate fundamental principles and to provide experience in designing and testing electronic hardware and computer software. Both curricula have required senior design courses which give students comprehensive experience in designing, building and testing physical systems.

## CURRICULA

In addition to the core courses described above, students in the electrical engineering curriculum take courses in electromagnetic fields and solid-state devices or electric power systems in their junior year and thermodynamics in their senior year. Students must take four courses of their choice in their senior year from more than 20 elective courses offered in communications, control systems, digital systems, electric power systems, electromagnetics, microelectronics, and robotics.

In addition to the core courses described above, students in the computer engineering curriculum take courses in discrete mathematics, design of complex digital systems, advanced programming, operating systems, and data structures in their sophomore and junior years. Students must take three courses of their choice in the senior year. A variety of elective courses are offered in communications, controls, digital systems, microelectronics, and VLSI design. In addition, several senior-level courses in computer science are approved as elective courses for computer engineering.

## CURRICULUM IN ELECTRICAL ENGINEERING
## Degree earned: B.S. in Electrical Engineering

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to COE | 0 |
| E 115 Intro. to Computing Environ | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 114 Intro. to Computing - C++ | 3 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 205 Physics for Engr. & Sci I | 4 |
| Physical Education Elective | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| COM 110 Public Speaking | 3 |
| ECE 211 Electric Circuits I | 3 |
| ECE 213 Electric Circuits I Lab | 1 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CE 213 Intro. to Mechanics | 3 |
| ECE 212 Fund of Logic Des | 3 |
| ECE 214 Fund of Logic Des Lab | 1 |
| ECE 221 Electric Circuits II | 3 |
| ECE 223 Electric Circuits II Lab | 1 |
| MA 341 Applied Diff. Equations | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ECE 301 Linear Systems | 3 |
| ECE 303 Electromagnetic Flds | 3 |
| ECE 314 Electronic Circuits | 3 |
| MA 302 Num Applic. to Diff. Equations | 1 |
| MAE 301 Engineering Thermodyn.. I | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ECE 218 Computing Org & MicroProc. | 3 |
| ECE 305 Electric Pwr Systems **or** | |
| ECE 341 Solid State Devices | 3 |
| ENG 331 Comm. for Engr. & Technology | 3 |
| ST 370 Prob & Stat for Engr. | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Physical Education Elective | 1 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| COM 301 Presentational Speaking | 3 |
| Approved Technical Elective | 3 |
| Sr ECE Design Electives | 6 |
| Humanities/Soc.Sci. Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ECE 480 EE Sr Design Elective | 4 |
| Sr Design Elective **or** | |
| Approved Dept Elective | 3 |
| Approved Dept Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 16 |

Total Hours Required for Graduation ..... 125*

Note: only two of the four credit hours listed for PE count toward credit hours required for graduation.
All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester).

## CURRICULUM IN COMPUTER ENGINEERING
## Degree earned: B.S. in Computer Engineering

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to COE | 0 |
| E 115 Intro. to Computing Environ | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 114 Intro. to Computing - C++ | 3 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 205 Physics for Engr. & Sci. I | 4 |
| Physical Education Elective | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CSC 210 Concepts of Prog. Lang | 3 |
| ECE 212 Fund of Logic Des | 3 |
| ECE 214 Fund of Logic Des Lab | 1 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 222 Discrete Math Structures | 3 |
| ECE 211 Elect Circuits I | 3 |
| ECE 213 Elect Circuits I Lab | 1 |
| ECE 218 Computing Org & MicroProc. | 3 |
| MA 341 Applied Diff. Equations | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Physical Education Elective | 1 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CSC 202 Concep & Fac of Op Systems | 2 |
| ECE 221 Elect Circuits II | 3 |
| ECE 223 Elect Circuits II Lab | 1 |
| ECE 342 Des Complex Digit Systems | 3 |
| ST 370 Prob & Stat for Engr. | 3 |
| Comm. Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 311 Data Structures | 3 |
| ECE 301 Linear Systems | 3 |
| ECE 314 Electronic Ckts | 3 |
| ENG 331 Comm. for Engr. & Technology | 3 |
| MA 302 Numerical Applic. to Diff. Equations | 1 |
| Humanities/Soc. Sci. Elective | 3 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CE 213 Intro. to Mechanics | 3 |
| Senior Elective | 3 |
| Senior Design Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ECE 481 CPE Senior Design Project | 4 |
| CPE Senior Elective | 3 |
| CPE Senior Elective **or** Senior Design Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 16 |

Total Hours Required for Graduation ..... 124*

* Note: only two of the four credit hours listed for PE count toward credit hours required for graduation.
All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester).

# DEPARTMENT OF INDUSTRIAL ENGINEERING

Riddick Engineering Laboratories, Room 328

S. D. Roberts, *Head*

C. L. Smith, *Assistant Head and Director of Undergraduate Programs*

*University Professor:* S. E. Elmaghraby; *Alumni Distinguished Undergraduate Professor:* C. L. Smith; *James T. Ryan Professor:* T. J. Hodgson; *Professors:* M. A. Ayoub, R. H. Bernhard, S. C. Fang, W. L. Meier, H. L. W. Nuttle, P. J. O'Grady, R. G. Pearson, S.D. Roberts, W. A. Smith Jr., J. R. Wilson; *Professors Emeriti:* R. E. Alvarez, C. A. Anderson, J. R. Canada, R. W. Llewellyn, A. L. Prak; *Associate Professors:* C. T. Culbreth, Y. Fathi, R. E. King, E. T. Sanii, R. E. Young; *Assistant Professors:* D. R. Cormier, H. Damerdji, M. G. Kay, G. A. Mirka, R. O. Mittal, J. Trevino; *Lecturer* C.L. Smith.

## WORLD WIDE WEB ACCESS

The Department of Industrial Engineering may be viewed at the following URL: http://www.coe.ncsu.edu/departments/ie/

## CURRICULA

The industrial engineer designs, improves, and installs integrated systems of people, materials, equipment, and information, drawing upon specialized knowledge and skill in the mathematical, physical and social sciences, together with the principles and methods of engineering analysis and design to specify, predict and evaluate the results to be obtained from these systems. Productivity, cost, quality, and time are the principal concerns. While industrial engineering is focused on the manufacturing enterprise, industrial engineers are widely employed in service industries including hospitals, banks, insurance, and government, owing to the emphasis on systems engineering. Because industrial engineering concentrates on management systems, IE's are quick to move into management and they are ideal candidates for management consulting firms.

The curriculum blends a basic group of common engineering technical courses with specialized courses in the major design areas of industrial engineering consisting of manufacturing operations, human-based workplaces, production systems, and management control. The course offerings stress mathematical and statistical techniques of systems analysis; computing as a tool for problem-solving and simulation; economic analysis of processes; control of process, product, or service quality and production; manufacturing process specification; and workplace design for ergonomic health and safety.

The furniture industry in North Carolina manufactures products valued at over $4 billion each year and supports an annual payroll of $1.5 billion. The Bachelor of Science in Industrial Engineering, Furniture Manufacturing Option, prepares graduates for both engineering and managerial positions in this industry. The curriculum offers industrial engineering students a concentrated study of the materials, products, and processes of the furniture industry. Scholarship support is available to students in the FM Option through the Furniture Foundation and the American Furniture Manufacturers Association. Furniture companies provide summer and cooperative education jobs, and permanent employment opportunities exist on a national and international basis.

# CURRICULUM IN INDUSTRIAL ENGINEERING
## Degree earned: B.S. in Industrial Engineering

### FRESHMAN

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to COE | 0 |
| E 115 Intro. to Computing Environ | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 114 Intro. to Computing - C++ | 3 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom.& Calculus II | 4 |
| PY 205 Physics for Engr. & Sci. I | 4 |
| Physical Education Elective | 1 |
| | 15 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| IE 210 Engineering Graphics | 3 |
| CE 214 Engineering Mechanics- Statics | 3 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| ST 371 Intro. Prob & Dist Theory | 3 |
| Physical Education Elective | 1 |
| | 18 |

| *Spring Semester* | *Credits* |
|---|---|
| ECE 331 Prin. of Electrical Engineering | 3 |
| MA 303 Linear Analysis | 3 |
| MAT 201 Struc & Prop Engineering Materials | 3 |
| ST 372 Intro. Stat Infer & Regres | 3 |
| Engineering Science Elective | 3 |
| Physical Education Elective | 1 |
| | 16 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 331 Comm. for Engr. & Technology | 3 |
| IE 351 Mfg. Engineering | 3 |
| IE 352 Work Analysis & Design | 3 |
| IE 361 Deter Models in IE | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| IE 307 Real Time Cont Mfg. Proc. | 3 |
| IE 401 Stochastic Models in IE | 3 |
| IE 443 Quality Control | 3 |
| IE 452 Ergonomics | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 15 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| IE 308 Cont of Prod & Ser Systems | 3 |
| IE 311 Engineering Economic Analysis | 3 |
| IE 441 Intro. to Simulation | 3 |
| IE 453 Facilities Design | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| IE 498 Senior Design Project | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 12 |

Total Hours Required for Graduation ..... 120*

* Note: only two of the four credit hours listed for PE count toward credit hours required for graduation.
All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester).

# CURRICULUM IN INDUSTRIAL ENGINEERING, FURNITURE MANUFACTURING OPTION

## Degree earned: B.S. in Industrial Engineering, Furniture Manufacturing Option

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to COE | 0 |
| E 115 Intro. to Computing Environ | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 114 Intro. to Computing - C++ | 3 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 205 Physics for Engr. & Sci. I | 4 |
| Physical Education Elective | 1 |
| | 15 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CE 214 Engineering Mechanics - Statics | 3 |
| IE 210 Engineering Graphics | 3 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| ST 371 Intro. Prob & Dist Theory | 3 |
| Physical Education Elective | 1 |
| | 18 |

| *Spring Semester* | *Credits* |
|---|---|
| ECE 331 Prin. of Electrical Engineering | 3 |
| MA 303 Linear Analysis | 3 |
| ST 372 Intro. Stat Infer & Regres | 3 |
| Engineering Science Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Physical Education Elective | 1 |
| | 16 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 331 Comm. for Engr. & Technology | 3 |
| IE 240 Furn Prod Engineering | 3 |
| IE 352 Work Analysis & Design | 3 |
| IE 361 Deter Models in IE | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| IE 241 Furn Mfg. Proc. I | 3 |
| IE 307 Real Time Cont Mfg. Proc. | 3 |
| IE 443 Quality Control | 3 |
| IE 452 Ergonomics | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 15 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| IE 308 Cont of Prod & Ser Systems | 3 |
| IE 311 Engineering Economic Analysis | 3 |
| IE 340 Furn Mfg. Proc. II | 3 |
| IE 441 Intro. to Simulation | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| IE 498 Senior Design Project | 3 |
| IE 341 Furn Plant Layout | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 12 |

Total Hours Required for Graduation ..... 120*

* Note: only two of the four credit hours listed for PE count toward credit hours required for graduation.
All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester).

## MINOR IN INDUSTRIAL ENGINEERING

The minor in Industrial Engineering is designed to provide undergraduate engineering students and other science majors in curricula other than Industrial Engineering with the fundamentals of industrial engineering necessary for advanced study in the discipline and/or employment in industrial engineering related occupations. The minor in Industrial Engineering offers a structured program that allows students to acquire some limited level of expertise in areas common to all industrial engineers as well as a deeper knowledge in at least one specific area of interest.

This minor requires a minimum of 15 credit hours. Required credit hours total six and consist of IE 311 and any 400-level IE course. Elective hours total nine and must come from remaining IE designated courses. The GPA for the minor courses must be at least 2.000. Applications may be obtained from the Department of Industrial Engineering Undergraduate Office.

## MINOR IN FURNITURE MANUFACTURING

The minor in Furniture Manufacturing is open to all undergraduate degree students at NC State who are interested in gaining specialized knowledge of furniture product engineering and related manufacturing processes and design. A set of four cohesive courses provides for a concentrated study of this manufacturing industry as well as the application of industrial engineering fundamentals.

This minor requires a minimum of 15 credit hours. Required credit hours total 12 and consist of IE 240, IE 241, IE 340 and IE 341. Elective hours total three and must come from the following: IE 307, IE 308, IE 311, IE 352, IE 361, IE 441, IE 443, or IE 452. The GPA for the minor courses must be a least 2.000. Applications may be obtained from the Department of Industrial Engineering Undergraduate Office.

# DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

Riddick Engineering Laboratories, Room 229

J. J. Hren, *Head*

C.C. Koch, *Associate Head*

C.C. Koch, *Director of Graduate Programs*

D. Maher, *Undergraduate Coordinator*

*Kobe Steel Professor:* R.F. Davis; *University Distinguished Professor* : J. Narayan; *Distinguished Research Professor:* J.J. Cuomo; *Professors:* K. Bachmann, R.B. Benson Jr., N.El-Masry, J. Hren, A.I.Kingon, C.C. Koch, K.L. Murty, G.A. Rozgonyi, P.E. Russell, R.O. Scattergood; *Professors Emeriti:* W.W. Austin, H. Conrad, A.A. Fahmy, J.K. Magor, K.L. Moazed, H. Palmour III, H.H. Stadelmaier, R.F. Stoops; *Visiting Professors:* J.Russ, R.B.Tippin; *Adjunct Professors:* O. Auciello, J.T. Glass, J. Routbort, F. Shimura; *Research Professor :* D. Maher; *Associate Professors:* C.M. Balik, D.W. Brenner, R. Spontak; *Associate Professor Emeritus*: J. Hamme; *Visiting Associate Professor* : D. Griffis; *Adjunct Associate Professor :* J.T. Prater; *Research Associate Professor* : J. Kasichainula; *Assistant Professor :* Z. Sitar ; *Adjunct Assistant Professors* : J.B. Posthill, H.A. West; *Lecturer :* T.M. Hare; *Adjunct Lecturer:* C. Chiklis; *Associate Members of the Faculty:* D. Aspnes (Physics), J.A.Bailey (Mechanical and Aerospace Engineering), S.M.Bedair (Electrical and Computer Engineering), K.S. Havner (Professor of Civil Engineering), Y. Horie (Civil Engineering), H. Lamb (Chemical Engineering), G. Lucovsky (Physics), R.J.Nemanich (Physics), G.Parsons (Chemical Engineering), A.Reisman (Electrical and Computer Engineering), I. Rovner (Sociology and Anthropology), V.T. Stannett ( Chemical Engineering); *Interinstitutional Adjunct Faculty:* J. Sankar (NC A&T State University); *Adjunct Industrial Associate:* S. Bozeman.

The Department of Materials Science and Engineering offers programs to qualify graduates for positions in industry, educational institutions, and governmental agencies which involve design, development, selection, and processing of engineered materials. Typical industries served by graduates in materials science and engineering are aerospace, chemical and chemical processing, communications, electronics, energy production, manufacturing and fabricating of metals (including the automotive industry), ceramics and abrasives, construction materials, nuclear, and transportation.

## OPPORTUNITIES

The continuing industrial and technological growth of the United States and the Southeast in general and of the State of North Carolina in particular has been marked by a particularly strong demand for materials scientists and engineers. The pace of modern technological advances requires new materials and novel processing and/or fabrication methods. At the national level, materials research is prominently mentioned in most lists of critical or enabling technologies. As our understanding of materials science advances, common features and elements tend to unite many

different industries. As an example, consider that our current knowledge of silicon is necessary in the electronics, photovoltaics, optical fiber technologies, lasers, pollution control, and biomedical industries. Advanced understanding of polymers also crosses and unites several different industries ranging from plastics, textiles, electronics, and recycling.

Professional preparation and education in materials science and engineering provides career opportunities in a wide range of industries from those which produce and/or use metals, glass, polymers, or ceramics, to those which use such materials in an integrated fashion such as the microelectronics industry. These opportunities include careers in research and development of new materials, new processes for producing them, failure analysis, product design and reliability, and technical management at all levels of business.

## CURRICULUM

The materials scientist and engineer must be able to deal with a wide range of phenomena that occur in all classes of materials: metals, ceramics, polymers, composites, and electronic materials. The undergraduate curriculum is designed to provide balance by addressing the scientific and engineering principles applicable to all classes of materials as well as the particular engineering and design concepts unique to each class of material. Further emphasis in a specific area is provided by choosing one technical elective dealing with processing (metallic or ceramic materials) and one technical elective dealing with specific applications (composite materials or electronic materials). The basic science elective allows students to gain more fundamental knowledge in either solid state theory, organic, or physical chemistry. The required senior design courses (MAT 423-424) serve as capstone courses and provide a strong preparation for dealing with real industrial situations; the first course covers open-ended classroom exposures and participatory involvements in group dynamics and proposal preparation; the second course provides direct involvement with an industrial sponsor working on real problems submitted by industry. The remaining required courses are distributed among mathematics, physical sciences, and the humanities and social sciences.

The materials science and engineering program, which is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), leads to the degree Bachelor of Science in Materials Science and Engineering. A fifth year professional program is available for advanced study and further specialization. Graduate degrees are also offered (consult the *Graduate Catalog*).

# CURRICULUM IN MATERIALS SCIENCE AND ENGINEERING
## Degree earned: B.S. in Materials Science and Engineering

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I [1] | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to COE | 0 |
| E 115 Intro.to Computing Environ | 1 |
| ENG 111 Comp. & Rhetoric [1] | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 Prin. of Chemistry | 3 |
| CH 127 Prin. of Chemistry Lab **or** | 1 |
| CSC 110 Intro. to Computing - PASCAL **or** | (3) |
| CSC 112 Intro.to Computing - FORTRAN **or** | (3) |
| CSC 114 Intro. to Computing - C++ | (3) |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II [1] | 4 |
| PY 205 Physics for Sci. & Engr.. I [1] | 4 |
| Physical Education Elective | 1 |
| | 16-19 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CSC 110/112/114 Intro. Comp-Fortran/Pascal/C++ or | 3 |
| CH 107 Prin. of Chemistry | 3 |
| CH 127 Prin. of Chemistry Lab | 1 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| MAT 201 Struct & Prop Engineering Materials [2] | 3 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| | 17-18 |

| *Spring Semester* | *Credits* |
|---|---|
| MA 341 Applied Diff. Equations | 3 |
| MAT 210 Exp in Materials Engineering | 2 |
| MAT 225 Chemistry of Polymeric Materials. | 2 |
| MAT 301 Equil & Rate Proc.. | 3 |
| Basic Science Elective [4] | 3-4 |
| Physical Education Elective | 1 |
| | 14-15 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MAT 310 Computing Usage in Materials | 2 |
| MAT 324 Polymer Char Lab | 1 |
| MAT 330 Crystal Ch & Phase Equil | 3 |
| MAT 350 Mechanics. Prop. Of Materials I | 3 |
| MAT 425 Intro. to Polymer Materials | 3 |
| Advanced Writing Elective [5] | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| MAT 321 Phase Trans & Diffus | 3 |
| MAT 331 Electronic Prop of Materials | 3 |
| MAT 333 Electronic Prop Lab | 1 |
| MAT 434 Ceramic Engineering Lab | 1 |
| MAT 435 Physical Ceramics | 3 |
| MAT 450 Mechanics Prop of Materials II | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 17 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MAT 423 Intro. to Materials Engineering Design | 3 |
| MAT 430 Physical Metallurgy Lab | 1 |
| MAT 431 Physical Metallurgy I | 3 |
| 1st MaterialsTechnical Elective [6] | 3 |
| Humanities/Soc.Sci. Elective [3] | 3 |
| Humanities/Soc.Sci. Elective [3] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ECE 331 Prin. Elect Engineering I | 3 |
| MAT 424 Sr Design Project | 3 |
| MAT 491Materials Engineering Seminar [7] | 1 |
| 2nd Materials Technical Elective [6] | 3 |
| Humanities/Soc.Sci. Elective [3] | 3 |
| Humanities/Soc.Sci. Elective [3] | 3 |
| | 16 |

Total Hours Required for Graduation ..... 126 [8]

Students entering the program after the spring semester of 1994 must demonstrate proficiency in a foreign language at the FL_102 level for graduation.
All students in Materials Science and Engineering must take **both** CH 107 and, **either** CSC 110 or CSC 112 or CSC 114.

[1] A "C" or better must be earned in these courses. This is a graduation requirement and they must be satisfied in order for an engineering student to be eligible to enroll in a 200 or higher level course in the College of Engineering.

[2]. A "C" or better must be earned in these courses. This is a departmental graduation requirement.
[3] Humanities and Social Sciences courses to be selected from appropriate list approved by the College of Engineering.
[4]. CH 220, CH 437, or PY 407.
[5] Either ENG 331 or ENG 333.
[6]. Fall: MAT 440, MAT 445, or MAT 475. Spring: MAT 460 or MAT 556.
[7] MAT 491 Seminar may be taken either semester of senior year.
[8] Credits for the first two PE courses do not count towards the minimum credits required for graduation.

## MINOR IN MATERIALS SCIENCE AND ENGINEERING

The Minor in Materials Science and Engineering is designed to provide undergraduate engineering students and other science majors in curricula *other* than Materials Science and Engineering with the fundamentals of modern materials science and engineering necessary for advanced study in materials science and engineering and/or employment in materials related fields. The Minor in Materials Science and Engineering offers a structured program that allows students to become familiar with the common features of all materials and to gain a deeper knowledge of at least one specific area of interest including ceramics, polymeric, metallic, or electronic materials. This minor requires 16-17 hours of concentration consisting of ten hours of specified MAT courses (including MAT 201 and MAT 210) and 6-7 hours of additional courses. The GPA for the minor courses must be at least 2.000. For information concerning the minor, contact the Undergraduate Coordinator.

# DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

Broughton Hall, Room 3211

F. R. DeJarnette, *Head*

J. S. Strenkowski, *Associate Head*

G. K. F. Lee, *Director of Graduate Programs*

A. S. Boyers, *Undergraduate Administrator*

M. L. Gonzalez, *Coordinator of Advising*

*Alumni Distinguished Undergraduate Professors:* E. M. Afify, M. A. Boles, R. R. Johnson; *Alumni Distinguished Graduate Professors:* F. R. DeJarnette, H. A. Hassan; *R. J. Reynolds Industries Professor:* C. F. Zorowski; *Professors:* J. A. Bailey, A. E. Bayoumi, T. A. Dow, H. A. Hassan, T. H. Hodgson, E. G. Humphries, R. F. Keltie, C. Kleinstreuer, G. K. Lee, C. J. Maday, D. S. McRae, J. C. Mulligan, R. T. Nagel, J. N. Perkins, L. H. Royster, L. M. Silverberg, F. Y. Sorrell, J. S. Strenkowski, G. D. Walberg; *Professor and Senior Extension Specialist:* H. M. Eckerlin; *Adjunct Professors:* J. P. Archie Jr., D. P. Dewitt, J. N. Juang, D. E. Klett, E. R. McClure; *Visiting Professor and Senior Extension Specialist:* M. M. Fikry; *Professors Emeriti:* R. A. Burton, M. H. Clayton, J. A. Edwards, B. H. Garcia Jr., W. C. Griffith, F. J. Hale, F. D. Hart, M. N. Ozisik, F. O. Smetana, J. K. Whitfield; *Associate Professors:* N. Chokani, J. W. David, J. W. Eischen, R. D. Gould, C. E. Hall Jr., E. C. Klang, J. W. Leach, P. I. Ro, F. G. Yuan, M. A. Zikry; *Adjunct Associate Professors:* J. G. Cleland, J. H. Hebrank, K. R. Iyer, D. W. Lee, R. M. Potter, J. S. Stewart; *Assistant Professors:* J. R. Edwards Jr., L. P. Franzoni, K. M. Lyons, M. K. Ramasubramanian, W. L. Roberts IV; *Adjunct Assistant Professors:* D. P. Colvin, J. A. Cooke, B. Driehuys, K. J. Falter, A. O. Hobbs, S. D. Holland, M. R. Jolly, M. M. Nazemi, M. A. Norris, M. T. Odman, D. J. Rossetti, S. E. Southward, M. R. Spano; *Lecturers:* G. O. Batton, A. S. Boyers, M. L. Gonzalez, R. J. Vess; *Lecturer Emeritus:* R. J. Leuba; *Adjunct Lecturer:* D. H. Youden; *Adjunct Instructor:* H. G. Hoomani; *Interinstitutional Faculty:* V. S. Avva, M. J. Ruiz, K. M. Whatley.

Mechanical engineering involves practical applications of mechanical and thermal sciences to research, design, development, testing, and manufacturing of a wide variety of products. The diverse areas to which mechanical engineers contribute include transportation, power generation and energy conversion, environmental control and pollution abatement, noise control, and biomechanics. Recent developments have increased interest in areas such as robotics, mechatronics, precision engineering, automated manufacturing systems, combustion, and propulsion. Student projects include min-Baja and Formula cars and walking machines.

Aerospace engineering has grown out of the challenge to design, construct, and operate vehicles ranging from helicopter and VSTOL to aircraft, rockets, and spacecraft. Each vehicle is a complex system involving aerodynamics, propulsion, materials, structures, and controls. Their design is difficult because they must be lightweight and also operate reliably and efficiently in the harsh environment encountered in space and planetary atmospheres as well as earth's atmosphere. Student projects related to space transportation and exploration are performed at the Mars Mission Research Center on the Centennial Campus.

## FACILITIES

Both computational and experimental laboratories are heavily involved in both programs. They include measurements, data analysis, and performance evaluation of mechanical and thermal systems for mechanical engineering. Aerospace engineering has subsonic and supersonic wind tunnel testing, propulsion systems, structures, and controls laboratories.

Senior design projects require students to work in teams in the analysis, design, construction, and testing of a mechanical or thermal product proposed by industry. Aerospace engineering senior design involves analysis, design, construction, and flight testing of a remotely piloted vehicle or flight readiness checkout of a mockup of a spacecraft.

The Department has three machine shops and an electronics and instrument shop which are staffed by four technicians.

## OPPORTUNITIES

The flexibility and breadth of the mechanical engineering curriculum culminates in a broad range of employment opportunities in machinery and power-related applications the world over. Mechanical engineers are well qualified for research, design, and manufacturing applications. The employment demand for them exceeds the supply and is among the highest of engineering programs.

## CURRICULA

Because of the close relationship between mechanical and aerospace engineering, both curricula are administered by one department. They are nearly the same for the freshman and sophomore years but quite different in the junior and senior years. Each program is designed to provide the student with an understanding of both the science on which the discipline is founded and the applied science and technology which characterizes its specific character. In addition the programs provide students with an opportunity to develop the skills for applying their acquired knowledge. The aerospace engineering and the mechanical engineering programs, which are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), lead to the degrees Bachelor of Science in Aerospace Engineering and Bachelor of Science in Mechanical Engineering, respectively. Graduate degrees are also offered (consult the *Graduate Catalog*).

# CURRICULUM IN AEROSPACE ENGINEERING
## Degree earned: B.S. in Aerospace Engineering

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to COE | 0 |
| E 115 Intro. to Computing Environ | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 205 General Physics | 4 |
| Physical Education Elective | 0 |
| | 14 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CSC 112 Intro. to Computing - FORTRAN | 3 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| MAE 206 Engineering Statics | 3 |
| PY 208 General Physics II | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| Physical Education Elective | 0 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| GC 211 Intro. Engineering Graphics MAE | 3 |
| MA 341 Applied Diff. Equations | 3 |
| MAE 208 Engineering Dynamics | 3 |
| MAE 261 Aero Vehicle Perf | 3 |
| MAE 314 Solid Mechanics | 3 |
| MAT 201 Struc Prop of Engineering Materials | 3 |
| | 18 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 331 Comm. Engr. & Technology. | 3 |
| MAE 301 Engineering Thermodyn.. I | 3 |
| MAE 355 Aerodynamics I | 3 |
| MAE 357 Expt Aero I | 1 |
| MAE 371 Aero Struc I | 3 |
| MAE 461 Dynamics & Controls | 3 |
| MAE 469 Controls Lab | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| ECE 331 Prin. Elect Engineering | 3 |
| MAE 356 Aerodynamics II | 3 |
| MAE 358 Expt Aero II | 1 |
| MAE 462 Fli Veh Sta & Control | 3 |
| MAE 472 Aero Vehicle Struc II | 3 |
| MAE 473 Aero Vehicle Struc II Lab | 1 |
| Humanities/Soc.Sci. Elective | 3 |
| | 17 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MAE 455 Boundary Layer Theory | 3 |
| MAE 475 Propulsion | 3 |
| MAE 466 Expt Aero III | 1 |
| MAE 478 Aero Vehicle Design I | 2 |
| Departmental Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| MAE 479 Aero Vehicle Design II | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Physical Education Elective | 1 |
| | 13 |

Total Hours Required for Graduation ..... 127*

* Note: only two of the four credit hours listed for PE count toward credit hours required for graduation.

All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester).

## CURRICULUM IN MECHANICAL ENGINEERING
## Degree earned: B.S. in Mechanical Engineering

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to COE | 0 |
| E 115 Intro. to Computing Environ | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 112 Intro. to Computing - FORTRAN | 3 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 205 Physics for Engr. & Sci. I | 4 |
| Physical Education Elective | 0 |
| | 14 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| GC 101 Engineering Graphics | 2 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| MAE 206 Engineering Statics | 3 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| Physical Education Elective | 0 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| MA 302 Numerical App to Diff. Equations | 1 |
| MA 341 Applied Diff. Equations | 3 |
| MAE 208 Engineering Dynamics | 3 |
| MAE 314 Solid Mechanics | 3 |
| MAT 201 Struct & Prop Engineering Materials | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Physical Education Elective | 1 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ECE 331 Prin. of Elect Engineering I | 3 |
| ENG 331 Comm. for Engr. & Technology | 3 |
| MAE 301 Engineering Thermodyn.. I | 3 |
| MAE 305 ME Lab I | 1 |
| MAE 315 Dynamics of Machines | 3 |
| MAE 316 Strength of Mechanics Computing | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| IE 311 Engineering Economic Analysis | 3 |
| MAE 302 Engineering Thermodyn.. II | 3 |
| MAE 306 ME Lab II | 1 |
| MAE 308 Fluid Mechanics | 3 |
| MAE 310 Heat Transfer (Cond & Rad) | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MAE 405 ME Lab III | 1 |
| MAE 410 Conv Heat Trans & Fl Flow | 3 |
| MAE 415 Mechanics Engineering Analysis | 3 |
| MAE 435 Prin. of Auto Control | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| MAE 412 Energy Systems | 3 |
| MAE 416 ME Design | 4 |
| Department Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 13 |

Total Hours Required for Graduation ..... 124*

* Note: only two of the four credit hours listed for PE count toward credit hours required for graduation.
All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester).

# DEPARTMENT OF NUCLEAR ENGINEERING

Burlington Engineering Laboratories, Room 1110

D. J. Dudziak, *Head*

O. E. Hankins, *Coordinator of Advising*

*Alumni Distinguished Undergraduate Professor*: K. Verghese; *Professors*: D. J. Dudziak, R. P. Gardner, J. G. Gilligan, K. L. Murty, P. J. Turinsky; *Professors Emeriti*: T. S. Elleman, R. L. Murray, R. F. Saxe, E. Stam, L. R. Zumwalt; *Adjunct Professors*: R. A. Gerwin, M. S. Wechsler; *Associate Professors*: M. A. Bourham, J. M. Doster, C. W. Mayo; *Adjunct Associate Professor*: Y. Azmy; *Assistant Professors*: O. E. Hankins, R. M. Mayo, M.-S. Yim; *Adjunct Assistant Professors*: K. R. Earnshaw, D. J. Kropaczek; *Lecturer and Health Physicist*: G. D. Wicks; *Lecturer and Associate Director of Nuclear Reactor Program*: P. B. Perez; *Nuclear Services Manager*: J. N. Weaver.

Nuclear engineering is concerned with the engineering aspects of the control, release and utilization of nuclear energy from both fission and fusion. Nuclear reactors serve many functions—they serve as heat sources for electric power plants, are the basis of modern propulsion systems for ships and submarines, and produce fissionable and radioactive isotopes for a variety of peaceful applications. Nuclear methods are applied in medical diagnosis and treatment, scientific research, and the search for new resources. The nuclear engineering program educates individuals in scientific and engineering principles essential for effective and productive contributions in industrial, university and government service. The Nuclear Engineering Program, which is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), leads to the degree Bachelor of Science in Nuclear Engineering.

## WORLD WIDE WEB ACCESS

The Department of Nuclear Engineering may be viewed at the following URL: http://www.coe.ncsu.edu/departments/ne/

## OPPORTUNITIES

Nuclear power reactor construction continues with over one hundred reactors now operating in the nation, increasing our reliance upon nuclear energy as a substitute for energy from fossil fuels. Development of breeder and fusion reactors offers the potential of vast new energy sources. Industrial and medical applications of radiation continue to increase in diverse industries. A demand for nuclear engineers exists within the electric power industry and national laboratories.

## SCHOLARSHIPS AND AWARDS

Several special scholarships exist for NC State nuclear engineering students, including the Bechtel, Carolina Power and Light, Duke Power, Ebasco, Eastern Carolinas ANS, Piedmont ANS, Institute for Nuclear Power Operations, and American Nuclear Society scholarships. A special department fund supports scholarships for incoming freshmen and exceptional upperclassmen. NC State nuclear engineering students have received special recognition awards at the Undergraduate Research Symposium and have gained national recognition by several times receiving the Student Design Award of the American Nuclear Society. NC State nuclear engineering students are also frequent recipients of nationally awarded fellowships.

## FACILITIES

Facilities for nuclear education include a nuclear research reactor (PULSTAR), which can be operated at a steady state power of 1 MW; the Scaled Pressurized Water Reactor facility (SPWR), an operating 1/9 scale model of a nuclear power plant; radiation detectors and multi-channel analyzers; nuclear materials laboratory; thermal hydraulic laboratory; prompt gamma facility; neutron radiography unit; numerous computer facilities including graphic terminals, access to the NC State IBM 3090 supercomputer and the North Carolina Supercomputing Center CRAY Y-MP, an Alliant FX/4 parallel mini-supercomputer, numerous departmental computer workstations, several College of Engineering EOS engineering workstations, and microcomputers (PCS); plasma diagnostics laboratory; neutron activation analysis laboratory, high- and low-level radiochemistry laboratories, and plasma science laboratory.

## CURRICULUM

Nuclear engineers work in nuclear systems research, design, development, testing, operation, environmental protection, and marketing. The Bachelor of Science program prepares graduates for positions in industry, national laboratories, or for graduate study (consult the *Graduate Catalog*). The curriculum incorporates basic sciences and engineering, with emphasis on mathematics and physics, followed by course work in nuclear science and technology. Design concepts are introduced in numerous nuclear engineering courses throughout the curriculum to provide an integrated educational experience, capstoned by the senior nuclear engineering design project. Special emphasis is given to the engineering design of nuclear reactors and radiation systems. **Attention is also given to the efficient utilization of energy resources and to the environmental aspects of nuclear energy. Computers are widely used throughout the curriculum.

The nuclear engineering program, which is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), leads to the degree of Bachelor of Science in Nuclear Engineering. Advanced undergraduates who desire to attend graduate school at NC State and specialize in the areas of Fission, Fusion/Plasma, or radiological Engineering may enter a combined BS/MNE professional program during their senior year which will culminate at the end of their fifth year with both the Bachelor of Science in Nuclear Engineering and the Master of Nuclear Engineering degrees.

## CURRICULUM IN NUCLEAR ENGINEERING
## Degree earned: B.S. in Nuclear Engineering

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to COE | 0 |
| E 115 Intro. to Computing Environ | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Humanities/Soc.Sci. Elective * | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 205 Physics for Engr. & Sci. I | 4 |
| Physical Education Elective* | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CSC 112 Intro. to Computing - FORTRAN | 3 | CE 213 Intro. to Mechanics | 3 |
| MA 242 Analytic Geom. & Calculus III | 4 | MA 341 Applied Diff. Equations | 3 |
| NE 201 Intro. to Nuclear Engineering | 2 | NE 202 Fund of Nuclear Energy | 4 |
| PY 208 Physics for Engr. &Sci. II | 4 | PY 407 Intro. to Modern Physics | 3 |
| Humanities/Soc.Sci. Elective * | 3 | Humanities/Soc.Sci. Elective* | 3 |
| | 16 | | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| MAE 301 Engineering Thermodyn. I | 3 | MA 401 Applied Diff. Equations II | 3 |
| MAE 308 Fluid Mechanics | 3 | MAT 201 Struct Prop of Engineering Materials | 3 |
| NE 301 Fund. of Nuclear Engineering | 4 | NE 302 Nuclear React Ener Conver | 4 |
| Spech/Writ/Foreign Lang Elective* | 3 | NE 401 React Analysis & Design | 4 |
| Humanities/Soc.Sci. Elective* | 3 | Physical Education Elective* | 1 |
| | 16 | | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| NE 402 Reactor Engineering | 4 | NE 403 Nuclear Engineering Design Project | 3 |
| NE 404 Radiation Safety & Shielding | 3 | NE or Technical Elective* | 3 |
| NE 405 Reactor Systems | 3 | Technical Elective* | 3 |
| NE or Technical Elective* | 3 | Humanities/Soc.Sci. Elective* | 3 |
| Humanities/Soc.Sci. Elective* | 3 | Humanities/Soc.Sci. Elective* | 3 |
| | 16 | Physical Education Elective* | 1 |
| | | | 16 |

Total Hours Required for Graduation ... 125 *

* Note: only two of the four credit hours listed for PE count toward credit hours required for graduation.
All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester).

# TEXTILE ENGINEERING PROGRAM

Textile Building Centennial Campus, Room 3250
(Also see College of Textiles)

M.H.Mohamed, *Head of the Department of Textile Engineering, Chemistry,and Science*
B. S. Gupta, *Associate Head*

G. N. Mock, *Program Director*

(For a list of faculty, see College of Textiles, Department of Textile Engineering, Chemistry, and Science)

The textile and related industries represent a major part of the manufacturing segment of the American economy with the industry mainly concentrated in the Southeast. The textile industry of North Carolina comprises approximately one-fourth of the United States textile industry. The textile industry in North Carolina represent 40-50 percent of the industrial employment. The value of textile products alone produced in North Carolina totals some $18 billion a year.

The textile industry is rapidly changing to become a capital-intensive, high-technology industry. Applications of computers and robotics are commonplace in the modern plant. Textile engineering is concerned with the application of scientific principles and engineering practice to the design and control of all aspects of fiber, textile and apparel processes, products and machinery.

The Textile Engineering program, which is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), leads to the degree of Bachelor of Science in Textile Engineering.

## FACILITIES AND SCHOLARSHIPS

(See College of Textiles)

## OPPORTUNITIES

Because the modern production and utilization of textile materials require people highly competent in the areas of engineering, mathematics, science and technology, graduates of the program are prepared for challenging careers in the primary textile, man-made fiber, apparel and nonwovens industries, as well as the textile machinery, automotive, aerospace and construction industries. Opportunities abound in plant engineering, quality engineering, production control, process engineering, and product development.

## CURRICULUM

The Textile Engineering program investigates how scientific principles and engineering practices can be applied to the diverse requirements of textile materials, processes, structures and machinery. The program combines study of textile, physical, mathematical and social sciences with engineering analysis and design techniques. Students study the interaction of fibers and fabrics with machinery, as

well as consider such issues as quality, safety, process control and project management. Completion of a B.S. in Textile Engineering provides the individual with a broad engineering background suited to addressing textile engineering problems. Since training in textile engineering involves two distinct technical fields - textiles and engineering - the curriculum is a joint responsibility of the two colleges and is so administered.

## CURRICULUM IN TEXTILE ENGINEERING
## Degree earned: B.S. in Textile Engineering

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 100 Intro. to COE | 0 |
| E 115 Intro. to Computing Environ | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 114 Intro. to Computing - C++ | 3 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 205 Physics for Engr. & Sci. I | 4 |
| Physical Education Elective | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MA 242 Analytic Geom. & Calculus III | 4 |
| MAE 206 Engineering Statics | 3 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| TC 203 Intro. to Polymer Chemistry | 3 |
| Physical Education Elective | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ECE 211 Electric Circuits I | 3 |
| ECE 213 Electric Circuits I Lab | 1 |
| MA 341 Appl Diff. Equations | 3 |
| MAE 208 Engineering Dynamics | 3 |
| TE 201 Polymer & Fib Sc & Engr. | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Physical Education Elective | 1 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MAE 301 Engineering Thermodyn.. I | 3 |
| MAE 308 Fluid Mechanics I | 3 |
| MAE 314 Solid Mechanics | 3 |
| TE 301 Text. Mfg. Proc. I | 4 |
| TE 305 Text. Instr & Controls | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 331 Comm. for Engr. & Technology | 3 |
| ST 370 Prob & Stat for Engineering | 3 |
| TC 301 Technology of Dyeing & Finish | 4 |
| TE 302 Text. Mfg. Proc. II | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| TE 303 Text. Chemical Proc. | 3 |
| TE 401 Text. Engineering Design I | 4 |
| TE 403 Mechanics of Fiber Struct | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| TE 402 Text. Engineering Design II | 4 |
| TE 404 Text. Engineering Quality Impr | 4 |
| Humanities/Soc.Sci. Elective | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| | 14 |

Total Hours Required for Graduation ..... 126*

* Note: only two of the four credit hours listed for PE count toward credit hours required for graduation.
All students who graduate from this curriculum must demonstrate competency in a foreign language at the 102 level (second semester).

# INDIVIDUALIZED DEGREE PROGRAM IN ENGINEERING

Page Hall, Room 120

The B. S. in Engineering degree offers an individualized academic program for those exceptional students who have academic and career goals that cannot be accommodated by the other engineering degree programs. Before being admitted into the program, students must complete the freshmen year, have at least a 2.500 grade point average, have completed the course requirement for admission into an engineering degree program and have a plan of study approved by the student's advisory committee and the Dean. For information about the program, contact the Assistant Dean for Academic Affairs.

# PROFESSIONAL DEGREES

The College of Engineering offers professional curricula leading to the degrees of Aerospace Engineer, Civil Engineer, and Mechanical Engineer. This program is designed for engineering students holding baccalaureate degrees who find that an additional year of education is desirable, for practicing engineers who desire to take a year of professional work to update their training, and for students holding physical sciences or mathematics degrees who seek a professional level of education in engineering. The program is intended to be sufficiently flexible to meet a wide variety of student needs, and to emphasize professional course work. The curriculum consists of a minimum of 30 hours of credit at the 400 level or above, including at least 15 hours of credit at the 500 level or above.

Applicants who hold the bachelor's degree in engineering, physical sciences, or mathematics may be admitted to the professional program of the College of Engineering upon application and presentation of official credentials. For unconditional admission, these credentials must show a minimum grade point average of 2.500 overall. Admission on a provisional basis may be granted to applicants who do not meet the formal requirements. In the case of insufficient preparation, prerequisite courses will be prescribed in addition to the normal fifth-year requirements. **Completion of the professional degree program does not qualify the recipient to sit for the Fundamentals of Engineering examination.**

The following requirements of the College of Engineering will be observed:

1. Professional degree students are admitted through the Undergraduate Admissions Office as fifth-year professional degree (PR) students. They are subject to rules and regulations as established and administered by the Dean of the College of Engineering.
2. Application forms for admission to the professional degree program should be completed and submitted to the Assistant Dean for Academic Affairs at least 60 days in advance of the semester in which admission is sought. Acceptance of a student for the professional program is based on the recommendation of his department and the approval of the Assistant Dean for Academic Affairs. At the time of acceptance, NC State students may transfer a limited number of excess credits to their professional program.
3. A limited amount of credit to be applied toward the requirements for the professional degree may be transferred to NC State from recognized institutions offering advanced work in engineering and related fields. Such a transfer of credit must be approved by the department in which the students do their major work and by the Dean of the College of Engineering.
4. A graduate in one field of engineering may choose to work for a professional degree in another field provided he or she has the permission of the department. The student will be expected to take necessary prerequisite courses in addition to those required for the professional degree program.
5. Each fifth-year student will be assigned to an advisor in the sponsoring department. The function of the advisor is to assist the students in preparing a program of study and to counsel them with regard to academic work. Prior to the midterm of the first semester, the students and their advisors should agree on a program of study for the professional degree. Program of Study for Professional Degree forms will be prepared and submitted to the office

of the Assistant Dean for Academic Affairs as well as to the department. Upon approval of the Office of the Dean, this becomes the student's degree program.

6. Grades for each completed course are reported to the Dean of the College of Engineering and to the Office of Registration. A minimum grade of "C" must be made in each course to obtain credit. A quality point average of 2.500 in all course work must be maintained to satisfy requirements for a professional degree.
7. All courses taken by the student after admission to the professional program will count toward the overall grade point average even though an individual course may not be a part of the degree program.
8. A student who falls below 2.500 average will be placed on probation and given one semester to raise the overall average up to a 2.500. If the student has been admitted on a provisional basis, he or she must make a 2.500 average the first semester in order to continue.
9. Work completed more than six years prior to the date on which the professional degree is to be granted may not be used as credit toward the professional degree, unless approved by the head of the department concerned and the Assistant Dean for Academic Affairs.
10. A professional degree student who has been admitted to the Graduate School may, with the approval of a Master's Degree committee and the Graduate School, transfer nine hours of credit for courses in which a grade of B or higher was received.
11. A student may transfer only once, that is, from the Professional Degree Program to the Graduate School or from the Graduate School to the Professional Degree Program. Therefore, a student is not permitted to return to either program after having transferred from that degree program.
12. It is intended that professional degree students will complete a substantial portion of credit hours toward the degree while in residence on the NC State campus.

# COLLEGE OF FOREST RESOURCES

*Biltmore Hall, Room 1022A*
*NCSU Box 8001*
*Raleigh, NC 27695-8001*

*Phone:* *(919) 515-6191*
*Fax:* *(919) 515-7231*
*Internet E-mail:* *forest_res@ncsu.edu*

L. W. Tombaugh, *Dean*

J. D. Wellman, *Associate Dean for Academic Affairs and Coordinator of Advising*

J. B. Jett, *Associate Dean for Research*

K. Martin, *Assistant to the Dean for Academic Affairs and Lecturer*

C. D. Argentati, *Natural Resources Librarian*

J. L. Bettis, *Coordinator of African-American Students*

The mission of the College of Forest Resources is to develop high-impact professionals, new ideas, and technology to assure that natural resource-based enterprises are managed in ways that are economically sound and environmentally sustainable. This mission is pursued through programs of undergraduate and graduate instruction, research, and extension.

The College of Forest Resources is the only unit in the University of North Carolina System that combines accredited programs in forestry, wood and paper science, and recreation and park management. It thus has a unique responsibility to provide the leadership, the science, and the technology that will contribute to improved management of renewable natural resources, more productive and competitive resource-based enterprises, and an improved quality of the environment. Renewable natural resources serve three broad purposes, and these purposes define the programs of the College of Forest Resources.

First, forests and related natural resources provide goods and services that are useful to society and that provide the basis for industrial activities, jobs, and income. The College has a special mission to provide well-educated personnel, new technology, and service to the forest products industry--an industry that adds $73 billion to the value of the U.S. economy each year and that employs nearly 9 percent of all people working in U.S. manufacturing. This industry is particularly important to the

economy of our state. It ranks second in terms of manufacturing employment in North Carolina, and its products include pulp and paper, lumber, plywood, particle board, and furniture. An important part of our mission is to contribute to the efficiency and profitability of forest products enterprises while assuring the continued availability of raw materials and productive forests in the long run.

The second use of renewable natural resources--forests, wildlife, open spaces--is for leisure time activities. Whether enjoyed in urban settings or in national parks and forests, leisure time experiences are essential to the overall quality of life in an increasingly technological society. The College prepares professionals to deal with planning, organizing, and managing parks, recreation and sports programs, and commercial recreation and tourism facilities.

Finally, natural resources interact in complex ways to produce a finely woven, delicate web of ecological relationships. It is not just the quality of life, it is in some instances life itself that will depend on our capability to understand and maintain a harmonious relationship with the natural environment. All departments within the College conduct teaching, research, and extension activities directed to understanding and contributing to the maintenance of a high quality environment.

## DEGREE PROGRAMS

The College of Forest Resources offers programs of study leading to baccalaureate and graduate degrees in the management and use of natural resources and also offers courses in the same arena to students in other colleges. Seven professional curricula are administered in the College through its Departments of Forestry; Parks, Recreation and Tourism Management; and Wood and Paper Science, and an eighth curriculum is offered through joint administration of the Fisheries and Wildlife Sciences Program with the College of Agriculture and Life Sciences. These programs provide a broad education in the biological, physical, and social sciences as well as a sound cultural and professional background. Baccalaureate degrees prepare students for careers in the fields of fisheries and wildlife sciences; forest management; natural resources assessment and management; parks, recreation and tourism management; pulp and paper science and technology; watershed hydrology and wood products.

****University Physical Education requirements have been modified. It is recommended that students consult with their adviser on specific curriculum requirements regarding PE.*

Graduate degrees offered include Master of Science, Master of Forestry, Master of Natural Resources Administration, Master of Parks, Recreation and Tourism Management, Master of Wood and Paper Science, and the Doctor of Philosophy. Graduate degree programs may be tailored to a variety of specialized and interdisciplinary topics related to the teaching and research activities of the College. Applicants should consult the *Graduate Catalog* for additional information about these programs.

## GIFFORD PINCHOT SCHOLARS PROGRAM

The Gifford Pinchot Scholars Program, a joint program with the College of Humanities and Social Sciences, follows the model established by the Jefferson, Franklin and Whitney Programs. Academically talented students are invited to pursue simultaneously a B.S. degree in Forest Management through the College of Forest Resources and a B.A. degree in a major in Humanities and Social Sciences through the College of Humanities and Social Sciences. The Pinchot Scholars Program is limited to a small number (10 or fewer per year) of highly qualified and motivated students. Scholarship support is available to some participants in the Pinchot Scholars Program.

Pinchot Scholars follow the requirements for the B.S. in Forest Management (with one exception: the physics sequence PY 211-212 is not required). For the B.A. degree, they follow a 30-hour major concentration in multidisciplinary studies. Included in this major are two core requirements: MDS 340 Perspectives in Agricultural History (3 credits) and MDS 498 Senior Thesis (3 credits). Participants also complete an additional MDS seminar (1 credit). In addition, Pinchot Scholars complete all the general education requirements for a B.A. degree in the College of Humanities and Social Sciences. A total of 155 credit hours is required for the double degree which students can complete in four and a half years.

The multidisciplinary studies major will involve placing forest management in the context of cross-cultural perspectives, global issues, and public policy. The exact set of courses that will constitute the major will be determined by students in consultation with their advisory group, subject to the approval of the Multidisciplinary Studies Committee. Each student is assigned an advisory group consisting of an academic advisor from each college, plus a mentor from the forest industry. Pinchot Scholars also participate in existing cooperative activities with other double-degree program scholars. For more information, contact the Associate Dean for Academic Affairs, College of Forest Resources, 1022-N Biltmore, Box 8001 or the Assistant Dean for Undergraduate Academic Affairs, College of Humanities and Social Sciences, 201-M Winston, Box 8101.

## COMPUTER COMPETENCY

Extensive use of microcomputers and workstations is incorporated throughout all curricula of the College of Forest Resources. Each program begins with a basic course in computer competency in the freshman year, and students are expected to use the computer for increasingly complex class assignments and for the preparation of papers and reports. Computing resources are available for student use in the College and elsewhere on campus, but many students find it advantageous in terms of convenience to purchase a personal computer. Questions about such a purchase should be directed to the Associate Dean for Academic Affairs or the appropriate departmental curriculum coordinator.

## FIELD INSTRUCTION AND WORK EXPERIENCE

All curricula in the College have strong components of hands-on field and laboratory instruction and experience, and all either require or strongly recommend voluntary on-the-job work experience. All students (except those in natural resources) are required to complete the equivalent of one or more of the following summer activities: camp, internship, practicum, work experience. The forest management and fisheries and wildlife curricula both have required summer camps. Undergraduates enrolled in parks, recreation and tourism management complete a nine-week internship immediately following the completion of the junior year. All pulp and paper majors spend at least one summer working in an industrial setting designated by the College. Wood products students attend a summer practicum following the sophomore year. Students in all curricula may also participate in summer jobs and the cooperative education program to gain work experience.

Local field trips are a regular part of many courses. Additional field instruction and scheduled trips to representative industries and agencies are frequently required as a part of regular class assignments.

## HONORS AND SCHOLARS PROGRAMS

The College of Forest Resources participates in the University Scholars Program in which exceptional new students (freshman or transfer) are selected for special courses and activities that provide an expanded educational experience.

The purpose of the College of Forest Resources' Honors Program is to offer the opportunity for advanced students with outstanding records to enhance the depth of study in their major field. Students with an overall GPA of 3.000 or better and a major GPA of 3.250 or better are invited to participate in the Honor Program. Students must have at least 40 hours of credit. Honors students develop more rigorous

programs of study, frequently taking advanced courses in mathematics, science, or social science or graduate courses in the chosen curriculum. With the adviser's consent honors students may substitute preferred courses for normally required courses in order to develop strength in special interest areas. Honors students are required to undertake a program of independent study which can involve a research problem or special project during their junior or senior year, and they must participate in the senior honors seminar.

Two honor societies in the College of Forest Resources promote and recognize academic excellence: Xi Sigma Pi (for all majors within the college) and Rho Phi Lambda (for recreation majors). Advanced undergraduate and graduate students with high academic achievement are invited to become members of these societies. High achieving forest management and natural resources students are also eligible for recognition by two agriculture honor societies, Alpha Zeta and Gamma Sigma Delta. All students are also eligible for recognition by the campus-wide honor societies.

## SCHOLARSHIPS

The College of Forest Resources administers a large program of academic scholarships that is separate from the University Merit Awards Program. Academic scholarships (ranging from $1,000 to $4,000 per year) and renewable annually are awarded in several program areas to entering freshmen and transfer students. The appropriate departments accept applications, and based on academic excellence and leadership award the scholarships that are administered through the North Carolina Forestry Foundation and the Pulp and Paper Foundation. The awards include a total of over 170 scholarships for students in the forest management; natural resources; parks, recreation and tourism management, pulp and paper science and technology; and wood products and technology curricula.

## INTERNATIONAL ACTIVITIES

Students in the College of Forest Resources are exposed to the international dimensions of their programs in a variety of ways. Many faculty members regularly travel abroad and a number are active in major projects in foreign countries, including an international cooperative research project concentrating on Central America and Mexico and a faculty exchange program with Sweden. With that faculty experience, the international aspects of many topics are covered in core courses, and several elective undergraduate and graduate courses focus specifically on the international dimensions of natural resource management. In addition, many international students

enroll in the College, with as many as 21 different countries represented in recent years.

## STUDENT ACTIVITIES

Each department in the College has a student curriculum club and/or student chapter of the appropriate national professional organization. All of these organizations provide opportunities for professional development, for interaction with faculty and other students, and for participation in local, regional, and national student and professional activities. Student representatives from each organization and curriculum serve on the College of Forest Resources Council. The Council provides overall coordination for student activities, allocates funds for student activities, and oversees production of the *Pinetum*, the College of Forest Resources student yearbook.

## FACILITIES AND LABORATORIES

In addition to standard classrooms and teaching laboratories, the College of Forest Resources has a unique complex of indoor and field facilities that are utilized in the academic programs. Computer facilities include a general microcomputer lab, two labs with microcomputers and workstations for applications in geographic information systems and remote sensing, and network access to the university mainframe computer. Also available are several different analytical and biotechnology facilities, a photo interpretation lab, an extensive herbarium, and a wood sample collection. Facilities for field instruction and projects include 80,000 acres in forest: the Hofmann Forest on the Coastal Plain; the Hill, Schenck, Hope Valley and Goodwin Forests in the Piedmont; and the Slocum summer camp at the Hill Forest in Durham county. Specialized laboratories unique to wood products programs are contained in the Hodges Wood Products Laboratory and the Reuben B. Robertson Pulp and Paper Laboratory. Equipment in the Hodges Laboratory includes computer-controlled woodworking machinery, dry kilns, sawmill veneer lathe and numerous other items required to convert wood into products. The Robertson Laboratory is a 50,000 sq. ft. facility which contains laboratories and modern pulping and papermaking equipment dedicated to teaching and research activities. Examples of equipment are secondary fiber recycling equipment, a thermo mechanical pulping unit, paper machine, process control equipment, paper testing laboratory, and pulping digesters.

# DEPARTMENT OF FORESTRY

Biltmore Hall, Room 2018

Frederick W. Cubbage, *Head*

Awatif E. Hassan, *Assistant Head for Undergraduate Programs*

D. Lester Holley, *Assistant Head for Graduate Programs and Director of Graduate Programs*

*Distinguished University Professor:* E.B. Cowling; *Alumni Distinguished Undergraduate Professor:* R.R. Braham; *Alumni Distinguished Graduate Professor Emeritus and Carl Alwin Schenck Professor Emeritus:* C.B. Davey; *Edwin F. Conger Distinguished Professor Emeritus.* B.J. Zobel; *Professors:* H.L. Allen Jr., F.E. Bridgwater (USFS), R.I. Bruck, S.W. Buol, A.W. Cooper, E.B. Cowling, F.W. Cubbage, P.D. Doerr, E.C. Franklin, D.J. Frederick, L.F. Grand, A.E. Hassan, D.L. Holley Jr., J.B. Jett, R.C. Kellison, S. Khorram, J.G. Laarman, R.A. Lancia, R. Lea, J.R. McGraw, S.E. McKeand, R.L. Noble, R.R. Sederoff, A.G. Wollum; *Adjunct Professors:* G.L. Debarr, G.F. Dutrow, P. Farnum, N.E. Johnson, S. Linder, D.A. MacKinnon, P.A. Sanchez, R.W. Stonecypher, W.E. Towell; *Professors Emeriti:* D.A. Adams, R.C. Bryant, C.B. Davey, M.H. Farrier, W.L. Hafley, R.D. Hazel, W.T. Huxster, W.M. Kelly, W. D. Miller, T.O. Perry, R.J. Preston, L.C. Saylor, F.E. Whitfield, B.J. Zobel; *Associate Professors:* R.C. Abt, H.V. Amerson, R.R. Braham, M.A. Buford, J.E. deSteiguer (USFS), P.M. Dougherty (USFS), W.S. Dvorak, J.D. Gregory, L.H. Harkins, L.G. Jervis, E.J. Jones, J.P. Roise, A.M. Stomp, R.J. Weir; *Adjunct Associate Professors:* W.J. Barton, D.L. Bramlett (USFS), R.G. Campbell, R.G. Haight (USFS), C.C. Lambeth, D.L. Loftis, C.B. Webb, J.N. Woodman; *Associate Professor Emeritus.* E.M. Jones; *Assistant Professors:* G.B. Blank, M.M. Campbell, J.A. Collazo, B. Goldfarb, L.T. Henry, B. Liu, D.M. O'Malley, J.A. Richmond (USFS), T.H. Shear, R.W. Whetten; *Adjunct Assistant Professors:* M.C. Conner, L.J. Frampton, T.P. Holmes, (USFS), W.E. Ladrach, R.B. McCullough, S.C. McKelvey, R.C. Purnell, K.R. Roeder, G.A. Ruark (USFS), M.M. Schoeneberger (USFS), H.K. Steen, D.N. Wear (USFS); *Instructor:* J.L. Bettis; *Adjunct Instructor:* R.W. Slocum; *Specialists:* W.E. Gardner, R.A. Hamilton, M.A. Megalos, J. Sidebottom; Liaison Geneticist; J.R. Sprague; *Research Associates:* B.A. Bergmann, J.A. Brockhaus, B.L. Conkling, J.K. Donohue, C.H. House, E.M. Lunk, A.D. Sampson; *Research Assistants:* T.J. Albaugh, H.M. Cheshire, S.R. Colbert, E. Eastman, C.S. Furiness, D.W. Hazel, J.A. Jeuck, G. Pacheco, A.S. Tohmaz, R.A. Wilson, M.J. Young; *Associate Members of the Faculty:* P.T. Bromley (Zoology), H.A. Devine (Parks, Recreation and Tourism Management), W.J. Fleming (Zoology), F.B. Hain (Entomology), L.E. Hinesley (Horticultural Science), D.E. Moreland (USDA-Crop Science), R.A. Powell (Zoology), J.D. Wellman (Parks, Recreation and Tourism Management), E.A. Wheeler (Wood and Paper Science), B.E. Wilson (Parks, Recreation and Tourism Management), C.G. Williams (Genetics), T.R. Simons (Zoology).

The undergraduate program of the Department of Forestry prepares students for professional challenges, personal growth, and a lifetime of service as managers of renewable natural resources. The curricula endeavor to produce well-educated forestry and natural resources graduates who have the basic knowledge, skills, flexibility, and attitude needed for successful professional performance in a wide variety of career opportunities. Graduates will be prepared to face the challenges of competing uses of natural resources and the environment, and the pressures for increasing production of goods and services from natural ecosystems while maintaining their quality for future generations.

The Department of Forestry strives to enroll and graduate a high quality, culturally and racially diverse student body to enhance the diversity and richness of forestry and natural resources professionals. Its academic curricula are enriched by out-of-class

contacts among students, faculty, and practicing professionals, which promote a sense of professionalism and professional community. Gaining practical experience is encouraged through participation in summer employment and the cooperative education program.

The department has four Bachelor of Science programs: Forest Management, Natural Resources Ecosystem Assessment, Natural Resources-Policy and Administration and Environmental Sciences-Watershed Hydrology. The Forest Management curriculum provides the broad-based forestry education needed for direct employment into positions in a wide variety of forestry or forestry-related organizations. The Natural Resources curricula provide more generalized, interdisciplinary programs in natural resources management that focus on the area indicated in the curriculum titles. The curriculum in Environmental Sciences Watershed Hydrology focuses on the specialized area of hydrologic science and watershed management.

Instruction and practice in communications skills (both writing and speaking) are integrated into the required forestry (FOR) courses throughout the Forest Management curriculum and to a lesser extent in the forestry (FOR) and natural resources (NO) courses of the Natural Resources curriculum and in several of the professional courses of the Environmental Sciences Watershed Hydrology curriculum. The communications-across-the-curriculum program produces graduates who are highly competent and confident in the communication skills needed by successful natural resource managers and environmental sciences professionals.

The use of computers is integrated into all four of the curricula in a similar fashion. Introductory instruction in the use of computers is provided in the freshman year, and practical assignments on the use of computers as a tool in natural resource management are integrated into the advanced courses of all three curricula. The curriculum in Environmental Sciences Watershed Hydrology, in particular, has a very heavy emphasis on computer applications (including programming) throughout the general math and science courses as well as the advanced professional courses.

Information on department programs may be obtained by contacting Ms. Kris Martin, College of Forest Resources Recruiting Coordinator, NCSU, Box 8001, Raleigh, NC 27695-8001, phone (919) 515-5510 or Dr. Awatif E. Hassan, Assistant Head for Undergraduate Programs, Department of Forestry, NCSU, Box 8002, Raleigh, NC 27695-8002, phone (919) 515-7577.

## SCHOLARSHIPS

The Department of Forestry annually awards four types of scholarships that are available to freshmen, transfers, and advanced students: Academic, Forestry Summer Camp, Industrial and Work-Study. About 30 Academic Scholarships of $1500 each are awarded annually in April for the following academic year and are renewable provided that superior progress is made toward a degree. Five endowments provide these awards: John M. and Sally Blalock Beard, Edwin F. Conger, Hofmann Forest, James L. Goodwin, and Jonathan Wainhouse Memorial.

Four scholarships are available each year to students attending Forestry Summer Camp. Two scholarships are awarded in April to students attending the next camp and two are awarded after camp to the students who exhibited superior academic and professional skills while at camp. Two endowments provide these awards: Ralph C. Bryant and Maki-Gemmer-Johnson.

Three Industrial Scholarships are available each year. In addition to cash awards, the Industrial Scholarships provide practical work experience with industrial forestry organizations. Industrial Scholarships are supported by grants from Canal Wood Corp., Chesapeake Corp., and the North Carolina Forestry Association.

Approximately 12 Work-Study Scholarships are awarded each year, generally to juniors and seniors. Work-Study Scholarships, currently at $1500 each, carry a work requirement which is usually satisfied by assisting with operational activities on the college forests. This requirement means that recipients must be advanced students with some field skills. Three endowments provide these awards: Biltmore Forest, James L. Goodwin, and George K. Slocum.

Scholarship applications or questions should be directed to Dr. Richard Braham, Forestry Scholarship Coordinator (phone 919-515-7568).

## COOPERATIVE EDUCATION AND SUMMER WORK EXPERIENCE

Practical work experience is an important component of the professional degree programs in the Department of Forestry. That experience may be gained through participation in the Cooperative Education Program or through summer work experience. The department has close ties with a number of employers in the field of forestry and natural resources and provides placement assistance for the work experience programs. The Cooperative Education Program, which requires a minimum 2.250 GPA after at least one year of study for participation (many employers require a higher minimum), involves alternating semesters or summer periods on the job with semesters on campus for classes. A total of 12 months of work experience is required. Students who successfully complete the "co-op"

program are in high demand by employers. Interested students should contact the department placement officer, Mr. Larry Jervis (phone 919-515-7576).

## DUAL DEGREE PROGRAMS

Students enrolled in one of the department's degree programs who have a strong interest in another degree topic may obtain a second baccalaureate degree in addition to the primary one. Such dual degree programs may be designed to provide a broader base in a related technical field such as wood science and technology, fisheries and wildlife sciences, or soil science or to broaden the student's knowledge and skills in a supporting field such as business, economics, sociology, or political science. Joint programs require coordination of the courses required in both curricula and the additional time required to complete them depends on the similarity between the curricula and the use of electives in one to satisfy required courses in the other. One to several extra semesters may be required to complete two degrees but expanded employment opportunities are a definite benefit.

## TRANSFER STUDENTS

The Department of Forestry accepts NC State students with a minimum 2.000 GPA and students from other accredited colleges and universities with good academic records (minimum 2.500 GPA on a 4.000 scale preferred) as transfers into the Forest Management and Natural Resources curricula. Minimum GPAs of 2.750 and 3.000 respectively are required to transfer into the Environmental Sciences Watershed Hydrology curriculum. Students at community colleges, junior colleges, or other baccalaureate institutions who plan to transfer to one of the department's degree programs should closely follow the desired curriculum by taking the equivalent courses available. Only equivalent courses will be credited to the appropriate degree program after enrolling at NC State, and the time required to complete the degree will depend on the courses remaining in the degree track. Students applying for the Forest Management curriculum must have at least 30 credits equivalent to those in the freshman and sophomore years and must transfer here in the fall of the sophomore year in order to complete the courses required for summer camp. Questions about transfer procedures or courses should be directed to Dr. Awataif E. Hassan, Assistant Department Head for Undergraduate Programs (phone 919-515-7577).

## CURRICULUM IN FOREST MANAGEMENT

The curriculum in Forest Management is a professional program accredited by the Society of American Foresters that has long been ranked as one of the best among the 45 such programs in the country. With a rigorous math and science base, the curriculum produces graduates with a broad education in the natural sciences, humanities and social sciences, communications skills, computer competency, and the technical knowledge and skills needed for sound management of the multiple resources of natural and managed forest ecosystems. Preparatory courses in the freshman and sophomore years are followed by the 10-week forestry summer camp where the woods knowledge and field skills that are essential for all foresters are acquired. Core courses of the junior and senior years focus on forest ecosystem processes, applied economics, operational practices in forest stand management, measurement and analysis of forest stand components, policy issues in natural resource management and the management decision-making tools and skills needed to develop and implement forest management plans.

## OPPORTUNITIES

Graduates in Forest Management are in demand by state and federal land-managing agencies, by industrial concerns growing wood as raw material, by state forestry and agriculture extension services, by forestry-related organizations such as nurseries and landscape management firms, and by urban natural resource management agencies. Some graduates, after acquiring professional forestry experience, are self-employed as consultants and as operators or owners of forestry-related businesses. Several recent graduates have become high school teachers, some have joined the Peace Corps, some are working in forestry-related sales and marketing and in financial management and others have joined environmental consulting firms. Many, of course, go on to graduate school to specialize in a wide variety of forestry and related programs.

# CURRICULUM IN FOREST MANAGEMENT
## Degree earned: B.S. in Forest Management

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| CFR 134 Computers in Natural Resources | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| FOR 110 Intro. to Forestry | 2 |
| MA 121 Elements of Calculus[1] | 4 |
| Any 100-level PE in Fitness & Wellness [2] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 114 Intro. to Finite Math. with Applic.. | 3 |
| History/Literature Elective[3] | 3 |
| Physical Education Elective | 1 |
| | 14 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| FOR 212 Dendrology | 4 |
| PY 211 College Physics I | 4 |
| WPS(FOR) Wood Anatomy & Prop | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 201 Intro. to Agric. & Res. Economics | 3 |
| BO 360 Intro. to Ecology | 3 |
| History/Literature Elective | 3 |
| SSC 200 Soil Science | 4 |
| Physical Education Elective | 1 |
| | 14 |

### SUMMER CAMP[4]

| | |
|---|---|
| FOR 204 Silviculture | 2 |
| FOR 261 Forest Communities | 2 |
| FOR 264 Forest Wildlife | 1 |
| FOR 265 Fire Mgmt. | 1 |
| FOR 274 Mapping & Mensuration | 4 |
| | 10 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| FOR 303 Silvics & Forest Tree Physiology | 3 |
| FOR 319 Forestry Economics | 3 |
| FOR 353 Air Photo Interp. & Photogram | 3 |
| FW(ZO) 353 Wildlife Mgmt. | 3 |
| ST 311 Intro. to Statistics | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| FOR 304 Theory of Silviculture | 4 |
| FOR 374 Forest Meas., Modeling & Invent. | 3 |
| ENT (FOR) 402 Forest Entomology | 3 |
| FOR 434 Forest Operations & Analysis | 4 |
| PP(FOR) 318 Forest Pathology | 3 |
| | 17 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| FOR 405 Forest Mgmt. | 4 |
| FOR 472 Renew. Res. Policy & Mgmt. | 3 |
| Phil.,Relig.,Vis/Perf Arts Elective | 3 |
| Social Science Elective | 3 |
| Advised Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| FOR 406 Forest Invent. Analysis & Plan | 4 |
| Advised Elective | 3 |
| Humanities/Soc. Sci. Elective | 3 |
| Sci./Technology/Soc. Elective | 3 |
| | 13 |

Minimum Hours Required for Graduation ..... 128

[1] Students with appropriate math skills are encouraged to take the math sequence MA 131-231 or MA 141-241. Credit earned in MA 107, MA 108, or MA 111 does not apply toward the 128 minumum credit hours required for graduation.

[2] Four semesters of physical education are required for graduation but only the first two credit hours count toward the minimum of 128 credit required for graduation. At least one course must fulfill the "Fitness & Wellness" requirement (any PE course at the 100 level). Students may elect S/U grading for all PE courses.

[3] 21 credit hours of humanities/social science electives, distributed as shown below, must be selected from the university lists in the department curriculum handbook.

1. History or literature - 6 credit hours in any combination of history or literature courses.
2. Philosophy, religion, or visual or performing arts - 3 credit hours.
3. Social Science (anthropology, cultural geography, economics, politics and government, psychology, or sociology) - ARE 201 plus 3 credit hours of elective.
4. Science, technology, and society (humanities and social science perspective) - 3 credit hours.
5. Humanities/social science - 3 additional credit hours from any of the above categories or from the humanities/social science (additional) list.

[4] To be eligible for Summer Camp, the student must have passed all freshman and sophomore courses (including a minimum grade of C in ENG 111 & 112) with a minimum cumulative GPA of 2.000.

Notes:

1. Students enrolled in the Forest Management curriculum must follow the curriculum and make reasonable progress toward the degree.
2. Additional graduation requirements:
   a. Earn a minimum grade of C in ENG 111 & 112, FOR 212, FOR 274, FOR 303, FOR 304, FOR 319, FOR 353, FOR 374, FOR 405, FOR 406, FOR 434, and FOR 472.
   b. Achieve foreign language proficiency at the FL 102 level.
   c. Complete at least one course that focuses on a non-English speaking culture that is selected from the university list in the department curriculum handbook. The selected course may also satisfy humanities/social sciences requirement.
   d. Complete a minumum of 4 workshops in the Leadership Development Series selected from the list in the department curriculum handbook.

## FORESTRY SUMMER CAMP

An intensive, full-time, 10-week summer camp experience, with forestry field training in the Coastal Plain, Piedmont, and Mountain regions of North Carolina, is required in the Forest Management curriculum. The camp is based at the College's Hill Demonstration Forest with trips taken to other regions. Students take the summer camp after completion of the sophomore year and earn 10 semester credits for courses that provide a base of knowledge and skills for the advanced courses to come.

## MINOR IN FOREST MANAGEMENT

The Forest Management minor is open to all undergraduate degree students at NC State who are interested in learning the basics of the structure and functioning of forest ecosystems and the policies and practices of forest management. The minor will be useful to students in unrelated career fields who wish to have a better understanding of the scientific and policy issues involved in the sound stewardship of the nation's forests. The minor will be useful to students in related career fields

who may be responsible for management of natural resources or interacting with foresters.

The minor in Forest Management requires a minimum of 18 credit hours that includes two required courses, FOR 212 Dendrology and FOR 472 Renewable Resource Policy and Management, and 11 credits of elective courses. Students who wish instruction and field experience in forestry technical skills may choose to attend Forestry Summer Camp. For additional information, contact Dr. Awatif E. Hassan, Assistant Department Head for Undergraduate Programs (phone 919-515-7577).

## CURRICULA IN NATURAL RESOURCES

The two natural resources curricula offered by the Department of Forestry are components of the campus-wide baccalaureate degree program in Natural Resources. The curricula are designed to produce natural resources professionals with a broad interdisciplinary background coupled with a specific focus in natural resources management. The Natural Resources curricula are rigorous math and science-based programs with a common core of math, science, communications, and humanities and social science courses that provide a broad general education. Students in all Natural Resources curricula will begin the program in a common introductory course, NO 100, and complete the program in a common senior course, NO 400, that focuses on the tools and skills of natural resource management problem solving and decision making. Those common courses will highlight the integrated nature of a broad field and provide experience in the important professional practice of working together in interdisciplinary teams.

The curriculum in Natural Resources Ecosystem Assessment will produce graduates who have the knowledge and skills needed to inventory and describe the characteristics of natural ecosystems and evaluate the impacts of management practices. Ecosystem assessment or environmental impact assessment is an extremely important and somewhat specialized arena in the environmental field that requires individuals who understand ecosystem structure and processes; who can identify, measure, inventory, and describe ecosystems; and who can apply standard evaluation and classification systems such as wildlife habitat evaluation procedures and the federal wetland delineation criteria. To the strong science base of the core is added a concentration that provides advanced courses in sampling and measurement and in vegetation, soils, hydrology, and wildlife and fisheries. Many of the 400-level courses also address techniques and issues of natural resource management.

The curriculum in Natural Resources Policy and Administration will produce graduates who have the knowledge and skills to manage natural resources programs in a variety of settings and organizations with an emphasis on public agencies. The advanced courses of the curriculum provide a broad background in economics, policy, government, public administration, and natural resources management. An economics track begins with introductory microeconomics and culminates with environmental economics and public finance. Courses in the various levels of government and public administration provide in-depth knowledge of how public institutions work. Courses in forestry, wildlife and fisheries, and outdoor recreation provide background on issues and techniques of managing natural ecosystems for various uses. A common thread of how public policy on natural resources is influenced and developed runs through many of the courses already noted and culminates in two senior courses that focus on policy.

## OPPORTUNITIES

Graduates with the kind of knowledge and expertise provided by the Natural Resources Ecosystem Assessment curriculum are needed in a variety of public agencies and private organizations that are involved in environmental regulation and management. Examples are the wetlands protection programs of the US Environmental Protection Agency and the US Army Corps of Engineers and the various environmental regulatory programs of state and local governments. Private environmental consulting firms need entry-level professionals with broad skills in the field of environmental assessment. The broad natural resources background provided by this curriculum also provides a strong base for students who wish to go on to graduate school or environmental law or build additional specialties focused on specific job opportunities or career tracks.

The curriculum in Natural Resources Policy and Administration is designed to produce administrators and managers for public agencies and private organizations that are involved with management, administration, policy making, preservation, or regulation of natural resources. Examples are the USDI National Park Service, the US Environmental Protection Agency, the US Geological Survey, state and local government agencies and not-for-profit environmental organizations. The broad background in government, economics, policy, and natural resource management also provides a strong base for students who wish to pursue a graduate program in the natural resources economics and policy arena.

# CURRICULUM IN NATURAL RESOURCES, ECOSYSTEM ASSESSMENT
## Degree earned: B.S. in Natural Resources

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| CFR 134 Computers In Natural Resources | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 131 Analytic Geom. & Calculus A[1] | 4 |
| NO 100 Intro. to Natural Resources | 2 |
| Any 100-level PE in Fitness & Wellness[2] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| COM 110 Public Speaking or | |
| COM 112 Interpersonal Comm. | 3 |
| ENG 112 Comp. & Reading | 3 |
| FOR 252 Intro. to Forest Science | 3 |
| MA 231 Analytic Geom. & Calculus B | 3 |
| Physical Education Elective | 1 |
| | 17 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ARE 201 Intro. to Agric. & Res. Economics or | |
| EC 201 Intro. to Economics I | 3 |
| FOR 212 Dendrology | 4 |
| PE 253 Orienteering | 1 |
| PY 211 College Physics I | 4 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| MEA 101 Geology I: Physical | 3 |
| MEA 110 Geology I Lab | 1 |
| PS 201 Intro. to American Govt. or | |
| PS 202 State & Local Govt. | 3 |
| History/Literature Elective | 3 |
| SSC 200 Soil Science | 4 |
| Physical Education Elective | 1 |
| | 15 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BO 360 Intro. to Ecology | 3 |
| BO 365 Ecology Lab | 1 |
| FOR 353 Air Photo Interpret. & Photogram | 3 |
| ST 311 Intro. to Statistics | 3 |
| ZO 201 General Zoology | 4 |
| History/Literature Elective[3] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE (EC) 336 Intro. Res. & Environ. Economics | 3 |
| ENG 333 Comm.. for Sci. & Researchers | 3 |
| NO 300 Natural Res. Measurements | 4 |
| ZO 460 Aquatic Natural History Lab | 2 |
| FOR (FW) 404 Forest Wildlife Mgmt. | 3 |
| | 15 |

### SENIOR YEAR

| Fall Semester | Credits |
|---|---|
| BO 495F Wetland Plants | 3 |
| FOR 401 Watershed & Wetlands Hydrology. | 4 |
| FOR 584 Pract. of Environ. Impact Assess. | 4 |
| FW (ZO) 420 Fishery Science | 3 |
| Phil.,Relig. Vis/Perf. Arts Elective | 3 |
| | 17 |

| Spring Semester | Credits |
|---|---|
| Advised Elective | 3 |
| FW 485 Natural Res. Advocacy | 3 |
| NO 400 Natural Res. Mgmt. | 4 |
| SSC 452 Soil Classification | 4 |
| Social Science Elective | 3 |
| | 17 |

Minimum Hours Required for Graduation ..... 127

[1] Students with appropriate skills are encouraged to take the math sequence MA 141-241. Credit earned in MA 107, MA 108, or MA 111 does not apply toward the 127 minumum credit hours required for graduation.

[2] Four semesters of physical education are required for graduation but only the first two credit hours count toward the minimum of 127 credit hours required for graduation. At least one course must fulfill the "Fitness & Wellness" requirement (any PE course at the 100 level). Students may elect S/U grading for all PE courses.

[3] 12 credit hours of H/SS electives, distributed as shown below, must be selected from the university lists in the department curriculum handbook.

1. History or literature - 6 credit hours in any combination of history or literature courses.
2. Philosophy, religion, or visual or performing arts - 3 credit hours.
3. Social Science (anthropology, cultural geography, economics, politics and government, psychology, or sociology) - 3 credit hours of elective.

Notes:

1. Students enrolled in the Natural Resources, Ecosystem Assessment curriculum must follow the curriculum and make reasonable progress toward the degree.
2. Additional graduation requirements:
   a. Earn a minimum grade of C in ENG 111 & 112.
   b. Achieve foreign language proficiency at the FL 102 level.
   c. Complete at least one course that focuses on a non-English speaking culture that is selected from the university list in the department curriculum handbook. The selected course may also satisfy humanities/social sciences requirement.

## CURRICULUM IN NATURAL RESOURCES, POLICY AND ADMINISTRATION
## Degree earned: B.S. in Natural Resources

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| CFR 134 Computers In Natural Resources | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 131 Analytic Geom. & Calculus A[1] | 4 |
| NO 100 Intro. to Natural Resources | 2 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| COM 110 Public Speaking OR | |
| COM 112 Interpersonal Comm. | 3 |
| ENG 112 Comp. & Reading | 3 |
| FOR 252 Intro. to Forest Science | 3 |
| MA 231 Analytic Geom. & Calculus B | 3 |
| Physical Education Elective | 1 |
| | 17 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemsitry II Lab | 1 |
| ARE 201 Intro. to Agric. & Res. Economics OR | |
| EC 201 Intro. to Economics | 3 |
| MEA 101 Geology I: Physical | 3 |
| MEA 110 Geology I Lab | 1 |
| PY 211 College Physics | 4 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| PS 201 Intro. to American Govt. | 3 |
| SSC 200 Soil Science | 4 |
| ST 311 Intro. to Statistics | 3 |
| PE 253 Orienteering | 1 |
| ZO 201 General Zoology | 4 |
| | 15 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE (EC) 301 Intermediate Microeconmics | 3 |
| BO 360 Intro. to Ecology | 3 |
| BO 365 Ecology Lab | 1 |
| FOR 353 Air Photo Interpret. & Photogram | 3 |
| PRT 350 Outdoor Recreation Mgmt. | 3 |
| History/Literature Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE (EC) Intro. Res & Environ Economics | 3 |
| ENG 333 Comm.. for Sci & Researchers | 3 |
| NO 300 Natural Res. Measurements | 4 |
| PS 202 State & Local Govt. | 3 |
| History/Literature Elective | 3 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| EC 410 Public Finance | 3 |
| FOR 472 Renew. Res. Policy & Mgmt. | 3 |
| FW (ZO) 353 Wildlife Mgmt. OR | |
| FW (ZO) 420 Fishery Science | 3 |
| PS 312 Intro. to Public Admins | 3 |
| Phil.,Relig. Vis/Perf. Arts Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| FW 485 Natural Res.Advocacy | 3 |
| NO 400 Natural Res. Mgmt. | 4 |
| PRT 451 Prin. Recr. Plan. Facil. Dev. | 3 |
| Social Science Elective | 3 |
| ARE (EC) 436 Environ. Economics | 3 |
| | 16 |

Minimum Hours Required for Graduation ..... 124

[1] Students with appropriate math skills are encouraged to take the math sequence MA 141-241. Credit earned in MA 107, MA 108, or MA 111 does not apply toward the 124 minumum credit hours required for graduation.

[2] Four semesters of physical education (including any 100-level PE in Fitness & Wellness) are required for graduation but only the first two credit hours count toward the minimum of 124 credit hours required for graduation. Students may elect S/U grading for all PE courses.

[3] 12 credit hours of H/SS electives, distributed as shown below, must be selected from the university lists in the department curriculum handbook.

1. History or literature - 6 credit hours in any combination of history or literature courses.
2. Philosophy, religion, or visual or performing arts - 3 credit hours.
3. Social Science (anthropology, cultural geography, economics, politics and government, psychology, or sociology) - 3 credit hours of elective.

Notes:

1. Students enrolled in the Natural Resources, Policy and Administration curriculum must follow the curriculum and make reasonable progress toward the degree.
2. Additional graduation requirements:
   a. Earn a minimum grade of C in ENG 111 & 112.
   b. Achieve foreign language proficiency at the FL 102 level.
   c. Complete at least one course that focuses on a non-English speaking culture that is selected from the university list in the department curriculum handbook. The selected course may also satisfy humanities/social sciences or foreign language requirements.

## CURRICULUM IN ENVIRONMENTAL SCIENCES

Hydrology is the science of water that is concerned with the origin, circulation, distribution, and properties of the waters of the earth. Watershed hydrology then is the application of that science to the study of the storage, movement, and quality of water in the context of the natural landscape unit, the watershed, and the effects of man's activities on that water. The curriculum in Environmental Sciences, Watershed Hydrology will produce graduates who have the knowledge and skills needed to

analyze the hydrologic functioning of watersheds, to plan and implement watershed management practices, and to deal with the ecologic, social, political, and economic aspects of water resources problems. The Environmental Sciences core provides a strong education in the basic physical, biological, and mathematical sciences; the humanities and social sciences; and the structure and functions of natural ecosystems. Advanced courses of the concentration in Watershed Hydrology focus on hydrologic processes in watersheds; applications of hydrology in environmental management; skills of measurement, analysis, and communication; and computer applications. For information on entrance requirements for freshmen and transfer students, contact the curriculum coordinator: Dr. James D. Gregory, Department of Forestry, NCSU, Box 8008, Raleigh, NC 27695-8008, phone (919) 515-7567.

## OPPORTUNITIES

The increasing stresses on water resources resulting from population growth will maintain demand for hydrologists in a variety of career positions. Hydrologists are needed in research, technical, environmental assessment and management positions in a variety of federal and state agencies and private organizations. The Environmental Sciences, Watershed Hydrology curriculum meets the criteria of the US Office of Personnel Management for the position of Hydrologist; therefore, graduates will be qualified to serve as hydrologists in federal agencies such as the US Geological Survey, US Forest Service, US Army Corps of Engineers, and the USDA Soil Conservation Service. State agencies such as the Office of Water Resources and the Division of Environmental Management are also excellent sources of employment. In the private sector, hydrologists are needed by environmental consulting firms and environmental organizations and by companies that own and manage large areas of forested, agricultural, or urbanized land. The rigorous scientific and quantitative background in the field of hydrology in this curriculum also provides excellent preparation for students who wish to pursue a graduate program in water resources.

# CURRICULUM IN ENVIRONMENTAL SCIENCES, WATERSHED HYDROLOGY
## Degree earned: B.S. in Environmental Sciences

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| E 115 Intro. to Computing Environments | 1 |
| ES 100 Intro. to Environ. Sciences | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| Any 100-level PE in Fitness & Wellness [2] | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| PY 205 Physics for Engr. & Sci. I | 4 |
| CSC 112 Intro. to Computing - FORTRAN | 3 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| MEA 130 Intro. to Weather & Climate | 3 |
| MEA 135 Intro. to Weather. & Climate Lab | 1 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE 201 Intro. to Agric. & Res. Economics. or | |
| EC 201 Intro. to Economics I | 3 |
| CE 214 Engineering Mechanics- Statics | 3 |
| MA 341 Applied Diff. Equations I | 3 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| SSC 200 Soil Science | 4 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CE 215 Engineering Mechanics - Dynamics | 3 |
| FOR 353 Air Photo Interp. & Photogram. | 3 |
| BO 200 Plant Life | 4 |
| ST 380 Prob. & Stat. for Phys. Sciences | 3 |
| History/Literature Elective[2] | 3 |
| Physical Education Elective | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 360 Intro. to Ecology | 3 |
| BO 365 Ecology Lab | 1 |
| CE 382 Hydraulics | 3 |
| COM 110 Public Speaking or | |
| COM 112 Interpersonal Comm. | 3 |
| ENG 333 Comm. for Sci. & Researchers | 3 |
| NO 300 Natural Res. Measurements | 4 |
| | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BAE 471 Land Res. Environ. Engineering | 3 |
| FOR 401 Watershed & Wetlands Hydrology | 4 |
| MEA 565 Hydrogeology | 3 |
| PS 320 U. S. Environ. Politics | 3 |
| Phil.,Relig. Vis/Perf. Arts Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE (EC) 336 Intro. to Res.. & Environ. Economics. | 3 |
| BAE 473 Intro. to Surface/Water Qual. Mod. | 3 |
| ES 400 Environ. Sciences Proj. Course[3] | 3 |
| History/Literature Elective | 3 |
| Social Science Elective | 3 |
| Physical Education Elective | 1 |
| | 16 |

Minimum Hours Required for Graduation ..... 128

Additional graduation requirements:

a. Earn a minimum grade of C in ENG 111 & 112, CH 101, MA 141 & 241, PY 205, NO 300, BAE 471 & 473, ES 400, FOR 401, MEA 565.

b. Achieve foreign language proficiency at the FL_ 102 level.
c. Complete at least one course that focuses on a non-English speaking culture that is selected from the university list in the department curriculum handbook. The selected course may also satisfy humanities/social sciences or foreign language requirements.

[1] Four semesters of physical education (including PE 100) are required for graduation but only the first two credit hours count toward the minimum of 128 credit hours required for graduation. Students may select S/U grading for all PE courses.
[2] 12 credit hours of humanities/social science electives, distributed as shown below, must be selected from the university lists in the department curriculum handbook.
1. History or literature - 6 credit hours in any combination of history or literature courses.
2. Philosophy, religion, or visual or performing arts - 3 credit hours.
3. Social science (anthropology, cultural geography, politics and government, psychology, or sociology) - 3 credits.
[3] New course to be implemented.

# DEPARTMENT OF PARKS, RECREATION AND TOURISM MANAGEMENT

Biltmore Hall, Room 4008

P.S. Rea, *Head*

*Professors Emeriti:* T.I. Hines, W.E. Smith, R.E. Stemlof; *Professors:* H.A. Devine, P. S. Rea, C.D. Siderelis, M.R. Warren, J.D. Wellman; *Associate Professors Emeriti:* G.A. Hammon, L.L. Miller, C.C. Stott; *Associate Professors:* S.L. Kirsch, L.D. Gustke, C.S. Love, B.E. Wilson, G.L. Brothers, R.L. Moore; *Adjunct Associate Professor:* H.K. Cordell; *Assistant Professor:* M.A. Kanters; *Adjunct Instructors:* J.I. Connors, G.R. Worls; *Instructor:* K. Hamilton Brown, E.K. Lindsay; *Associate Members of the Faculty:* A. Attarian (Physical Education), C.E. Chesney (Agricultural Extension Service), J.D. Murray (UNC-Sea Grant), C.S. Vick (Cooperative Extension Service).

The department offers an interdisciplinary program combining elements of natural resource management with a concern for human services. Standards adopted by the recreation profession make college graduation a requirement for employment. North Carolina State University has facilities, staff, curriculum, program and an established reputation for comprehensive professional education in the study of parks, recreation and tourism management. The program is nationally accredited.

## OPPORTUNITIES

As increased discretionary time becomes available for large segments of the American population, opportunities for growth in the leisure service professions have increased dramatically. A recreation and park professional's goal is to influence people to use their discretionary time wisely and to improve the quality of their lives. This goal is accomplished by providing recreation programs and facilities for people in a variety of settings.

Career opportunities include employment by park and recreation departments operated by county and municipal governments; employment by state agencies such

as state parks, forests, and planning and advisory groups; and employment by the federal government with agencies such as the National Park Service, Corps of Engineers, U. S. Forest Service, and state park systems.

Other major employers include youth and family service organizations such as the YMCA, YWCA, Boys' Clubs, Boy and Girl Scouts. Industries employ recreation directors to head employee recreation programs. Recreation professionals are employed by schools as community school coordinators. Areas with perhaps the greatest growth potential for employment are tourism agencies and commercial recreation establishments such as resorts, private clubs, theme parks, and convention and conference centers.

## CURRICULUM IN PARKS, RECREATION AND TOURISM MANAGEMENT

The curriculum in parks, recreation and tourism management offers a broad general education background, basic professional and technical courses, and the opportunity to specialize in a particular field. General education courses are in natural sciences, psychology, sociology, political science, English, mathematics, physical sciences, and economics. Specialized courses are required in statistics and the use of computers.

The curriculum is designed to prepare men and women for a variety of positions in a young, dynamic and challenging profession. The focus of the curriculum is on management rather than face-to-face leadership. The curriculum provides 42 hours of professional course work that includes recreation philosophy, management techniques and skills, fiscal management, supervision, facility and site planning, programming, administration, and analysis and evaluation. A computer laboratory is utilized in many courses to provide the student with the best current technology available.

In addition to the general education requirements and the core professional requirements, students can begin to attain specialized training through concentration courses. At the beginning of the students' junior year they choose one of the following concentrations: tourism and commercial recreation, park management, natural resource management, program management, or sport management.

Academic studies on campus are supplemented by practical laboratory experiences in the Raleigh area, out-of-state field trips and study opportunities, and a ten-week internship with a park, recreation or tourism agency. Cooperative work-study programs are available.

# CURRICULUM IN PARKS, RECREATION AND TOURISM MANAGEMENT
## Degree earned: B.S. in Parks, Recreation, and Tourism Management

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CFR 134 Computers in Natural Resources | 1 |
| ENG 111 Comp. & Rhetoric[1] | 3 |
| MA 105 Math. of Finance OR | |
| MA 114 Intro. to Finite Math. with Applic. OR | |
| MA 121 Elements of Calculus | 3-4 |
| PRT 101 Parks, Rec., and Tourism Pract[2] | 1 |
| PRT 152 Intro. to Parks Rec. & Tourism[2] | 3 |
| Natural Science Elective[3] | 4 |
| Any 100-level PE in Fitness & Wellness[4] | 1 |
| | 16-17 |

| *Spring Semester* | *Credits* |
|---|---|
| Comm./Speech Elective | 3 |
| ENG 112 Comp. & Reading[1] | 3 |
| Natural Science Elective[3] | 4 |
| PRT 215 Park & Rec. Maint. Mgmt. | 3 |
| Physical Education Elective[4] | 1 |
| | 14 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| EC 201 Intro. to Economics OR | |
| ARE 201 Economics of Agric. | 3 |
| PSY 200 Intro. to Psychology OR | |
| SOC 202 Prin. of Sociology | 3 |
| PRT 216 Managing Park and Rec. Facilities | 3 |
| Advanced Writing Elective[1] | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| PRT 238 Inclusive Recreation OR | |
| PRT 358 The Recreation Program | 3 |
| Natural Science Elective (3) | 4 |
| Phil.,Relig. Vis/Perf. Arts Elective | 3 |
| History of Literature Elective | 3 |
| Physical Education Elective | 1 |
| | 15 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| PRT 350 Outdoor Recreation Mgmt. | 3 |
| PRT 359 Leadership, Supervision and Adm. | 3 |
| PSY 376 Human Growth and Dev. or | |
| SOC 301 Human Behavior | 3 |
| Sci. and Technology & Soc. Elective[5] | 3 |
| Statistics Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| PRT 380 Analysis & Eval. in PRT | 3 |
| Concentration | 3 |
| Natural Science (Other) Elective | 3 |
| Free Electives | 6 |
| | 15 |

### SUMMER SESSION

| | |
|---|---|
| PRT 475 Recreation and Park Internship | 8 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| PRT 454 Park and Rec. Finance and Adm. | 3 |
| PRT 476 Post Internship Seminar | 1 |
| Concentration | 3 |
| History or Literature Elective | 3 |
| Free Elective | 3 |
| | 13 |

| *Spring Semester* | *Credits* |
|---|---|
| PRT 451 Facility and Site Planning | 3 |
| PRT 477 PRT Mgmt. | 2 |
| Concentration | 3 |
| Sci., Technology & Soc. Elective[6] | 3 |
| Free Elective | 3 |
| | 14 |

[1] Students must receive a "C" or better grade in all English writing courses (111,112, and advanced writing elective)
[2] Students must take PRT 101 and 152 concurrently
[3] Natural Science courses must be from two different basic sciences (biology, chemistry, earth sciences and physics); two of the three courses must have a laboratory.
[4] First two PE credits do not count toward minimum credit hours required for graduation.
[5] Course must be selected from the Science, Technology, & Society (Science & Technology Perspective) List.
[6] Course must be selected from the Science, Technology, & Society (Humanities Perspective) List.
One of the Courses taken to satisfy the Science, Technology & Society requirements must include one of the following courses: FW 221, MDS 201, MDS 301, MDS 302, MDS 303, PHI 322.

Foreign language proficiency at the 102 level is required for graduation.
Among the courses taken to fulfill graduation requirements, at least one must focus on a non-English speaking culture.

## MINOR IN PARKS, RECREATION AND TOURISM MANAGEMENT

The academic minor in Parks, Recreation and Tourism Management, is offered to students interested in gaining a basic knowledge of the parks, recreation and tourism field and an understanding of the importance of leisure and recreation in American society. It is not intended to prepare students for a professional career in parks, recreation and tourism. Seven hours of required courses and nine hours of electives are necessary to complete the minor. The program provides a background in recreation and park management which is useful to students who will assume full-time careers that are associated with recreation and park services, and become involved in the park and recreation field as a volunteer, program leader or policy-making board member with such organizations as the Scouts, Y's, art advisory councils, and conservation organizations.

# DEPARTMENT OF WOOD AND PAPER SCIENCE

Biltmore Hall, Room 2105

G. A Baum, *Head*

R. D. Gilbert, *Director of Graduate Programs*

*Alumni Distinguished Undergraduate Professor:* M.W. Kelly; *Alumni Distinguished Graduate Professor and Elis & Signe Olsson Professor:* J.S. Gratz; *Reuben B. Robertson Professor:* H-M Chang; *Professors:* G.A. Baum, H-M Chang, E.L. Deal, J. Denig, J.S. Gratzl, C.A. Hart, J.A. Heitmann Jr., H. Jameel, T.W. Joyce, M.W. Kelly, H.G. Olf, E.A. Wheeler; *Professors Emeriti:* A.C. Barefoot, E.L. Ellwood, I.S. Goldstein, R.G. Hitchings, R.G. Pearson, R.J. Thomas; *Adjunct Professors:* E.K. Andrews, L.L. Edwards, T.K. Kirk, S.Y. Lin, R. Szymani; *Associate Professors:* S.J. Hanover, L.G. Jahn, J.S. Stewart; *Adjunct Associate Professors:* R.B. Phillips, H.A. Stewart; *Associate Professors Emeriti:* R.C. Gilmore, L.H. Hobbs, C.N. Rogers; *Assistant Professors:* B. Kasal, R.A. Venditti; *Adjunct Assistant Professor:* A.G. Raymond Jr.; *Instructor:* A.G. Kirkman; *Senior Research Associate:* C.L. Chen; *Research Associates:* R.L. Lemaster, N.C. Weidhaas; *Research Assistants:* W.S. Bryan, E.L. Jerger; *Director of Applied Research:* M.V. Byrd; *Associate Member of the Faculty:* R.D. Gilbert

The wood-based industry of North Carolina, as well as throughout the South, is a vital part of the nation's economy. In terms of the dollar value of shipments of wood products, the South leads all regions of the country. North Carolina manufactures more wood household furniture than any other state, ranks third in shipment value for all wood-based products and second in number of employees and wages paid. Thus, many opportunities exist in North Carolina and other southern states for careers in the wood-based industry.

The Department of Wood and Paper Science offers two curricula leading to Bachelor of Science degrees - Pulp and Paper Science and Technology, and Wood Products. Both curricula prepare men and women for careers in the wood-based and allied industries or in government agencies connected with wood resources.

## CURRICULA IN PULP AND PAPER SCIENCE AND TECHNOLOGY

Adrianna G. Kirkman, *In Charge*

The Pulp and Paper Science and Technology curriculum prepares students for careers in pulp and paper, an industry that ranks as the fifth-largest manufacturing industry in the United States. Science, engineering, and mathematics form the basis for a multidisciplinary approach to understanding the fundamental manufacturing principles involved. Students study wood pulping processes, chemical and by-product recovery systems, and pulp bleaching. In addition, various paper-making operations such as refining, sizing, coating, and drying are studied.

Two concentrations are available emphasizing the technological or engineering aspects of pulping and papermaking. The Technology Concentration provides an extensive background in the pulp and paper manufacturing processes and elective credit hours for studies in marketing, economics, management or other concentrations of interest to the student. Greater depth in the engineering principles underlying pulp and paper manufacturing can be obtained from the Chemical Engineering Concentration. Students who have completed the Chemical Engineering Concentration in pulp and paper science and technology can, in cooperation with the College of Engineering and with an additional semester of study, earn a Bachelor of Science in Chemical Engineering as a second degree.

## OPPORTUNITIES

Graduates of this curriculum find opportunities for challenging careers as process engineers, product development engineers, process control chemists, technical service engineers, quality control supervisors, and production supervisors. Design and construction engineering companies employ graduates as project engineers, and pulp and paper machinery companies use their education and skills for technical service and sales positions. Opportunities for managerial and executive positions are available to graduates as they gain experience.

## SUMMER INTERNSHIP

All pulp and paper majors are required to work one summer in a pulp or paper mill. One hour of academic credit is granted after completion of 12 weeks of mill work and presentation of a satisfactory report. In addition, students are urged to work in mills the other two summers, as the work provides valuable practical experience. Departmental advisors assist students in locating summer work.

## REGIONAL PROGRAM

The pulp and paper curriculum is a regional program approved by the Southern Regional Education Board as the undergraduate program to serve the Southeast in this field.

## SCHOLARSHIPS

Approximately 85 undergraduate academic scholarships are granted annually to new and continuing students by more than 100 companies comprising the Pulp and Paper Foundation.

# CURRICULUM IN PULP AND PAPER SCIENCE AND TECHNOLOGY, TECHNOLOGY CONCENTRATION

## Degree earned: B.S. in Pulp and Paper Science and Technology

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| E 115 Intro. to Computing Environments | 1 |
| EC 201 Economics I | 3 |
| ENG 111 Comp. & Rhetoric[1] | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| WPS 101 Intro. to Wood and Paper Science | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 205 Physics for Engr. & Sci. I | 4 |
| WPS 102 Intro. Pulp & Paper Technology | 1 |
| Any 100-level PE in Fitness & Wellness[2] | 1 |
| | 17 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 221 Organic Chemistry I | 4 |
| CHE 205 Chemical Process Prin.[1] | 4 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| WPS 215 Pulping Technology[1] | 3 |
| Physical Education Elective[2] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| WPS 216 Papermaking Technology[1] | 3 |
| Advised Elective[4] | 3 |
| Humanities/Soc. Sci./ History/Literature | 3 |
| | 17 |

### SUMMER SESSION

WPS 211 Pulp and Paper Internship ..... 1

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 331 Intro. Physical Chemistry | 4 |
| ST 361 Intro. to Statistics for Engr. | 3 |
| WPS 310 Paper Properties & Additives | 3 |
| Phil.,Relig. Vis/Perf. Arts Elective[3] | 3 |
| H/SS SCI/Technology/SOC[3] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 331 Comm. for Engr. & Technology | 3 |
| WPS 332 Wood and Pulping Chemistry | 3 |
| WPS 355 Pulp & Paper Unit Processes I | 3 |
| WPS 371 Pulping Process Analysis | 3 |
| H/SS History/Literature[3] | 3 |
| Physical Education Elective[2] | 1 |
| | 16 |

### SENIOR YEAR

| Fall Semester | Credits |
|---|---|
| WPS 410 Mo. & Sim. Pulp & Paper Process | 3 |
| WPS 475 Process Control | 3 |
| WPS 360 Pulp and Paper Unit Processes II | 3 |
| H/SS PSY/PS/SOC/ANT[3] | 3 |
| Advised Elective[4] | 3 |
| | 15 |

| Spring Semester | Credits |
|---|---|
| WPS 472 Paper Process Analysis | 3 |
| WPS 460 Environ. Issues | 3 |
| WPS 416 Project Mgmt. | 3 |
| H/SS[3] | 3 |
| Advised Elective[4] | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 128

[1] Minimum of C grade required for graduation in PPT

[2] Last two PE credits do not count toward minimum credit hours required for graduation

[3] 21 credit hours of H/SS electives must be selected from the university approved lists in the department curriculum handbook
[4] Contact your advisor for information on Advised Elective Courses

Foreign language proficiency at the FL 102 level required for graduation for all students admitted as freshman or transfer students beginning summer and fall 1994
At least one course must be taken which focuses on a non-English speaking culture; the selected course may also satisfy humanities/social sciences or foreign language requirements

## CURRICULUM IN PULP AND PAPER SCIENCE AND TECHNOLOGY, CHEMICAL ENGINEERING CONCENTRATION
## Degree earned: B.S. in Pulp and Paper Science and Technology

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 101 General Chemistry I | 3 | CH 107 General Chemistry II | 3 |
| CH 121 General Chemistry I Lab | 1 | CH 127 General Chemistry II Lab | 1 |
| E 115 Intro. to Computing Environments | 1 | ENG 112 Comp. & Reading | 3 |
| EC 201 Economics I | 3 | MA 241 Analytic Geom. & Calculus II | 4 |
| ENG 111 Comp. & Rhetoric[1] | 3 | PY 205 Physics for Engr. & Sci. I | 4 |
| MA 141 Analytic Geom. & Calculus I | 4 | WPS 102 Intro. Pulp & Paper Technology | 1 |
| WPS 101 Intro. to Wood and Paper Science | 1 | Physical Education Elective [2] | 1 |
| Any 100-level PE in Fitness & Wellness | 1 | | |
| | 17 | | |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 221 Organic Chemistry I | 4 | CH 223 Organic Chemistry II | 4 |
| CHE 205 Chemical Process Prin.[1] | 4 | CHE 225 Chemical Process Systems | 3 |
| MA 242 Analytic Geom. & Calculus III | 4 | MA 341 Applic. Diff. Equations I | 3 |
| WPS 215 Pulping Technology[1] | 3 | PY 203 Physics for Engr. & Sci. II | 4 |
| Physical Education Elective [2] | 1 | WPS 216 Papermaking Technology[1] | 3 |
| | 16 | | 17 |

SUMMER SESSION

WPS 211 Pulp and Paper Internship ..... 1

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 315 Quantitative Analysis | 4 | CHE 312 Transport Processes II | 3 |
| CHE 311 Transport Processes I | 3 | Option Elective CHE 316 [4] | 3 |
| CHE 315 Thermodyn. I | 3 | WPS 332 Wood & Pulping Chemistry | 3 |
| WPS 310 Paper Properties & Additives | 3 | WPS 371 Pulping Process Analysis | 2 |
| ENG 331 Comm.. for Engr. & Technology | 3 | WPS 381 Pulp & Bleach Chemistry Lab | 1 |
| Physical Education Elective [2] | 1 | Phil.,Relig.,Vis/Perf. Arts Elective | 3 |
| | 17 | H/SS/History/Literature [3] | 3 |
| | | | 18 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| WPS 360 Pulp & Paper Univ Process II | 3 |
| WPS 410 Mod & Sim P & P Processes | 3 |
| WPS 475 Process Control | 3 |
| H/SS SCI/Technology/SOC[3] | 3 |
| H/SS History /Literature[3] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| WPS 472 Paper Process Analysis | 3 |
| WPS 460 Environ. Issues in Paper Industry | 3 |
| WPS 416 Project Mgmt. | 3 |
| H/SS PSY/PS/SOC/ANT[3] | 3 |
| H/S[3] | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 128
With Option Elective ..... 131

Additional Courses for CHE Degree: CHE 330, CHE 446. CHE 450, ECE 331, or MAT 201

1 Minimum of C required for graduation in PPT; additional restrictions may apply for the CHE degree
2 Last two PE credits do not count toward minimum credit hours required for graduation
3 21 credit hours of H/SS electives must be selected from the College of Engineering List
4 To complete requirements for a second BS in CHE in nine semesters, the indicated CHE courses must be taken as "Option Elective"
*Foreign language proficiency at the FL 102 level required for graduation for all students admitted as freshman or transfer students beginning summer and fall 1994
** At least one course must be taken which focuses on a non-English speaking culture, the selected course may also satisfy humanities/social sciences or foreign language requirements

## MINOR IN PULP AND PAPER SCIENCE AND TECHNOLOGY

The Pulp and Paper Technology Minor is available to all undergraduate students enrolled in the university as degree candidates, except Pulp and Paper Technology majors. The minor requires 15 credit hours. Six hours of required courses provide a comprehensive overview of pulping and paper-making science and technology, including pulping, bleaching, chemical recovery, recycled fibers, stock preparation, papermaking, coating, printing, converting, and environmental aspects. Nine elective hours may be chosen from areas including paper properties, wood chemistry, unit operations, computer modeling and simulation of processes, project management, environmental issues, or process control. This course will provide more in-depth exposure to the basic pulping, bleaching and paper-making processes.

The Pulp and Paper Technology Minor, with its focus on paper-making science and technology, is intended to be especially valuable to students majoring in programs leading to careers in corporate or government positions which would interface with the paper and related industries. Students interested in business, scientific or engineering specialities which may interface with or be employed by these industries will find the minor especially useful.

The office location and phone number for students and others inquiring about the PPT minor is: Department of Wood and Paper Science, 2105 Biltmore Hall, 919-515-5807.

## CURRICULUM IN WOOD PRODUCTS

M. W. Kelly, *In Charge*

The wood products industry is of major importance to the economy of North Carolina and the Southeast. It ranks third in the state in the value of shipments, behind only textiles and tobacco products, and it is second to textiles in the number of employees. The managerial opportunities for graduates with a B.S. in Wood Products are excellent. Graduates of this program have a broad education in the humanities, communication skills, social and natural sciences, as well as the professional training required for managerial positions in the wood products industry. The curriculum, similar to a material science program, is based on the natural resource wood with an emphasis on industrial manufacturing and management. Graduates' knowledge of wood as a raw material enables them to properly design and process a variety of wood-based products of value to society. As the availability of nonrenewable resources decreases and their costs increase, the demand for wood, a renewable resource, increases. Currently, career opportunities are excellent and continued demand for individuals with a wood products education is anticipated.

### OPPORTUNITIES

The Wood Products curriculum at North Carolina State University, which is accredited by the Society of Wood Science and Technology, prepares graduates for production supervision, staff positions and management responsibilities in all types and sizes of wood industries. Careers also include positions with both large and small companies manufacturing consumer wood products such as furniture. Graduates are also in demand by suppliers to the wood manufacturing industries of chemicals and equipment.

### SCHOLARSHIPS

Approximately six undergraduate merit scholarships are granted annually to new and continuing students through the Forestry Foundation.

## TECHNICAL ELECTIVES

The curriculum provides a minimum of 15 credit hours for technical electives which may be used to pursue a minor in a variety of areas including business management, industrial engineering, graphic communications, forestry management or economics. For those undergraduates desiring exposure to more than one area, the technical electives may be chosen from these and other areas, depending on the individual's career goals.

## DUAL DEGREE PROGRAMS

Dual degree programs are available whereby students can obtain, in addition to a Bachelor of Science in wood products, a second Bachelor of Science degree in forestry, pulp and paper science, business management or in other areas. Credits beyond those required for the single degree program are necessary and a minimum of an additional year of study is usually required. Individuals interested in a dual degree should contact the appropriate departmental office.

## CURRICULUM IN WOOD PRODUCTS
### Degree earned: B.S. in Wood Products

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CFR 134 Computers in Forest Resources | 1 |
| ENG 111 Comp. & Rhetoric[1] | 3 |
| MA 131 Analytic Geom. & Calculus A[2] | 4 |
| WPS 202 Wood Anatomy and Properties | 3 |
| Any 100-level PE in Fitness & Wellness[3] | 1 |
| Phil.,Relig. Vis/Perf. Arts Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 231 Analytic Geom. & Calculus B[2] | 3 |
| WPS 203 Wood Physical Properties | 4 |
| Physical Education Elective[3] | 1 |
| | 15 |

SUMMER SESSION

| | |
|---|---|
| WPS 205 Wood Products Practicum | 5 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| EC 201 Intro. to Economics I | 3 |
| PY 211 General Physics I | 4 |
| Basic Science Elective | 3 |
| Sci., Technology, & Soc. Elective | 3 |
| Physical Education Elective | 1 |
| Free Elective | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| GC 101 Engineering Graphics I | 2 |
| PY 212 General Physics II | 4 |
| ST 311 Intro. to Statistics | 3 |
| WPS 350 Wood Products Literature | 2 |
| History or Literature Elective | 3 |
| Physical Education Elective | 1 |
| | 15 |

SUMMER SESSION

WPS 210 Forest Products Internship ..... 1

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 311 Comm.. Engr. & Technology. | 3 |
| (Comm.. or Sp. Elective) | |
| WPS 301 Wood Processing I | 4 |
| WPS 319 Prin. of Wood Science | 3 |
| Humanities/Soc.Sci.Elective | 3 |
| Technical Elective [4] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| IE 311 Engineering Economics Analysis | 3 |
| WPS 302 Wood Processing II | 4 |
| WPS 344 Intro. to Quality Control | 3 |
| History or Literature Elective | 3 |
| Technical Elective[4] | 3 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| WPS 441 Wood Mechanics | 4 |
| WPS 482 Senior Topics in WPS | 2 |
| Technical Electives[5] | 6 |
| Free Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| WPS 444 Wood Composites | 3 |
| WPS 450 Wood Industry Case Studies | 2 |
| ANT.,GEO., PS., PSY., or SOC Elective | 3 |
| Technical Elective[4] | 3 |
| Free Elective | 3 |
| | 14 |

Minimum Hours Required for Graduation ..... 127

[1] D grades not acceptable
[2] Students with appropriate math aptitude are encouraged to register for MA 141 and MA 241
[3] First two PE credits do not count toward minimum credit hours required for graduation
[4] Technical Electives are selected from business, management, science or applied fields with advisor approval to meet the career goals of the student

Foreign language proficiency at the FL 102 level is required of all NC State graduates

## MINOR IN WOOD PRODUCTS

The Wood Products minor is available to all undergraduate students, except Wood Products majors, enrolled in the university as degree candidates. The minor requires 15 credit hours. Ten hours of required courses provide a general background in wood anatomy, physical properties, and wood-based composites. Five elective hours may be chosen from areas including wood processing, wood mechanics, quality control, and wood-polymer interactions.

The Wood Products minor, with its focus on wood properties and processing, is designed to be especially valuable to students majoring in programs leading to careers in areas such as structural design, furniture manufacturing, and forestry. Students interested in natural and renewable materials will also find the minor useful.

# COLLEGE OF HUMANITIES AND SOCIAL SCIENCES

*Caldwell Hall, Room 106*
*NCSU Box 8101*
*Raleigh, NC 27695-8101*

*Phone:* *(919) 515-2467*
*Fax:* *(919) 515-7856*
*Internet E-mail:* *chass@ncsu.edu*

M.A. Zahn, *Dean*

M.M. Sawhney, *Associate Dean*

G.D. Garson, *Associate Dean for Planning and Management*

M.S. Reynolds, *Associate Dean for Research and Graduate Programs*

E.T. Funkhouser, *Assistant Dean for Undergraduate Academic Affairs*

S.E. Simonsen, *Assistant to the Dean for International Studies*

J.N. Wall, *Director of Honors/Scholars Programs*

D.B. Greene, *Coordinator of Arts Studies*

L.H. Hambourger, *Coordinator of Evening Programs and Assistant to the Dean*

M.T. Leach, *Coordinator for African-American/Minority Student Advising*

The College of Humanities and Social Sciences offers programs of study which lead to baccalaureate and advanced degrees in the disciplines of the humanities and social sciences. The college also offers courses in these disciplines which are required in all undergraduate degree programs. In this way the university provides its students the opportunity to prepare for a full life in the professions and occupations that require intellectual flexibility, broad knowledge, and a basic comprehension of human beings and their problems.

The College of Humanities and Social Sciences is comprised of seven departments: Communication, English, Foreign Languages and Literatures, History, Philosophy and Religion, Political Science and Public Administration, and Sociology and Anthropology (also a department in the College of Agriculture and Life Sciences). The Division of Multidisciplinary Studies, an academic unit responsible for

interdisciplinary programs, is affiliated with the college; the division also administers the Social Work Program.

The college offers undergraduate majors in communication, English, French, history, multidisciplinary studies, philosophy, political science, religious studies, social work, sociology, and Spanish. In addition, special options or concentrations are available within some of the major programs: communication disorders, mass communication, public relations, and theatre (major in communication); rhetoric, writing, and language (major in English); philosophy of law/law and political philosophy (major in philosophy or political science); anthropology (major in sociology), and criminal justice (major in political science or sociology). A Teacher Education Option is available in English, French, Spanish, and social studies (history, political science, sociology). Enrollments in teacher education programs may be limited. Degrees granted include the Bachelor of Arts, Bachelor of Science, Bachelor of Social Work, Master of Arts, and Doctor of Philosophy, as well as professional degrees in political science and sociology.

****University Physical Education requirements have been modified. It is recommended that students consult with their adviser on specific curriculum requirements regarding PE.*

## BACHELOR OF ARTS PROGRAM

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ENG 111 Comp. & Rhetoric | 3 | ENG 112 Comp. & Rhetoric | 3 |
| FL 201 Intermediate Foreign Language I[1] | 3 | History[3] | 3 |
| Social Science[3] | 3 | Math.[4] | 3 |
| History[3] | 3 | Philosophy[6] | 3 |
| Math.[4] | 3 | Social Science[3] | 3 |
| Any 100-level PE in Fitness & Wellness[2] | 1 | Physical Education Elective[2] | 1 |
| | 16 | | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| Literature[7] | 3 | Arts and Letters Elective[10] | 3 |
| Natural Science[8] | 4 | Literature[7] | 3 |
| Sci., Technology & Soc.[9] | 3 | Natural Science[8] | 4 |
| Social Science[3] | 3 | Social Science[3] | 3 |
| Physical Education Elective[2] | 1 | Physical Education Elective[2] | 1 |
| Free Elective | 3 | Free Elective | 3 |
| | 17 | | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| HSS 100 CHASS Computer Literacy[a] | 0 |
| Major[c] | 6 |
| Natural Science[d] | 3 |
| Free Electives | 6 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| Major[c] | 9 |
| Free Electives | 6 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Major[c] | 9 |
| Free Electives | 6 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| Major[c] | 6 |
| Free Electives | 7 |
| | 13 |

Minimum Hours Required for Graduation ..... 124

[1]Demonstrated proficiency at the first-semester intermediate level (FL_ 201) in a foreign language. In order to enroll at the 201 level, prerequisites must be met through course work or the Placement Test. Demonstrated proficiency at the second-semester intermediate level (FL_ 202) in one of these languages is required for English and foreign language majors.

[2]Any 100 level PE course for Fitness & Wellness and three additional credit hours of PE activity courses for four hours graduation credit are required.

[3]This two-semester requirement includes a course concerned with pre-industrial Western or non-Western societies (HI 207, 208, 209, 215, 216, 263, 264, 270, 275, or 276), and another dealing with the United States or post-industrial Western societies (HI 205, 210, 221, 222, 233, 251, or 252).

[4]Two courses (6 hours credit) are required: two mathematics courses are required for sociology majors; one mathematics course and one course in statistics (ST 101 or 311) are required for political science majors. For all other humanities and social science majors the requirement may be satisfied with any two mathematics courses or one mathematics course plus a course in statistics or logic (except that philosophy majors may not use logic to fulfill the mathematics requirement).

[5]The requirements call for twelve hours of social science representing at least three of the following disciplines: anthropology, cultural geography, economics, political science, psychology, and sociology. At least nine hours must be outside the student's major field.

[6]Three hours of philosophy, exclusive of logic (LOG 201 and 335), are required.

[7]This requirement consists of two literature courses, at least one of which must be in literature outside the United States and prior to the twentieth century. One of the courses must come from the following: ENG/FL 221, ENG/FL 222; ENG 251*, ENG 261*, ENG 262*; FLF 301; FLS 301; FLG 316; or FLR 303. The second course may also come from the list above or it may be a course in American or twentieth century literature (either ENG/FL 223, ENG/FL 224; ENG 246, ENG 248, ENG 252, ENG 265, ENG 266; or FLR 304), or it may be an upper-division survey course or literature course in a period, genre or major figure in English, a foreign language in English translation, or the original foreign language (either ENG 305, 349, 351, 362, 363, 369, 370,371, 372,373, 376, 377, 380, 382, 383, 385, 390, 398, 399, 420,439, 448, 449, 451, 453, 462, 463, 464,465,468, 469,470,471, 486, 487; ENG/FL 394,406,407; FLF 302, 320, 323, 324, 352, 414, 415, 492; FLG 323; FLS 302, 304, 325, 403, 404, 492; or GRK 320).

*Students using ENG 261 or ENG 262 to satisfy this requirement may **not** also use ENG 251.

[8]The natural science requirement calls for a minimum of eleven credit hours. Students must receive credit for two different basic introductory courses chosen from the university approved lists in physics, chemistry, the earth sciences, and the biological sciences. The third course may be any of the basic introductory courses listed above or any course from the university approved list of Natural Sciences (Other Natural Sciences in Addition to Biology, Chemistry, Earth Sciences, Physics). At least two courses must include a laboratory experience. Note: if BIO 125 or 105 has been taken, the other may not be taken for credit; BO 200 may not be combined with either BIO 125 or BIO 105; and CH 100 may not be taken for credit if the student has previously received credit for CH 101.

[9]One three-credit course taken from the university approved lists of courses in Science, Technology and Society (Humanities and Social Sciences Perspectives list or Science and Technology Perspectives list). Courses used to meet this requirement may not be used to fulfill any other requirement and may not be drawn from the student's major field of study.

[10]One of the following three-hour courses outside the student's major is required: music, history of art, dance (including the DAN 272/295 sequence) or multi-arts (including MDS 251, 252, 351) or a course in film (ENG 282 or 492, COM 364 or 374, MDS 496) or theatre (COM 103, 203, 213, 233, 243, 303, 313, 323, 333) or in religion (any REL course other than a Hebrew language course), rhetoric (COM 321/ENG 321 or COM 411/ENG 411) or classics (GRK/LAT 310).

[11]Certification of computer literacy through the successful completion of HSS 100 is a graduation requirement for all majors in the College of Humanities and Social Sciences.

[12]Major requirements for the Bachelor of Arts range from 30 to 42 credit hours in the major. Contact department for list of courses to be used to meet major requirements.

## BACHELOR OF SCIENCE PROGRAM

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 101/121 General Chemistry I | 4 | CH 107/127 General Chemistry II | 4 |
| ENG 111 Comp. & Rhetoric | 3 | ENG 112 Comp. & Rhetoric | 3 |
| Social Science Elective[3] | 3 | Math.[2] | 3-4 |
| Math.[2] | 4 | Social Science Elective[3] | 3 |
| Any 100-level PE in Fitness & Wellness[1] | 1 | Physical Education Elective[1] | 1 |
| | 15 | | 14-15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| PY 205 or 211 Physics I | 4 | PY 208 or 212 Physics II | 4 |
| Literature/History[4] | 3 | Arts and Letters Elective[7] | 3 |
| Major Course I[5] | 3 | Literature/History[4] | 3 |
| Math.[2] | 3-4 | Major Course II[5] | 3 |
| Philosophy[6] | 3 | Math.[2] | 3 |
| Physical Education Elective[1] | 1 | Physical Education Elective[1] | 1 |
| | 17-18 | | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| HSS 100 CHASS Computer Literacy[8] | 0 | Major Course IV[5] | 3 |
| Advanced Writing/Comm.[9] | 3 | Major Course V[5] | 3 |
| Biology/Earth Science[10] | 4 | Option Course II[11] | 3 |
| Major Course III[5] | 3 | Option Course III[11] | 3 |
| Option Course I[11] | 3 | Free Elective | 3 |
| Sci., Technology & Soc.[12] | 3 | | 15 |
| | 16 | | |

SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| Major Course VI[5] | 3 | Major Course VIII[5] | 3 |
| Major Course VII[5] | 3 | Major Course IX[5] | 3 |
| Option Course IV[11] | 3 | Option Course V[11] | 3 |
| Free Electives | 6 | Free Electives | 4-6 |
| | 15 | | 13-15 |

Minimum Hours Required for Graduation ..... 124*

*Must also have demonstrated foreign language proficiency at the FL_102 level.

[1]Any 100 level PE course for Fitness & Wellness and three additional credit hours of activity courses for four hours graduation credit are required.

[2]Four courses starting with a sequence of either MA 131 and 231 or MA 141, 241, and 242, and one or two of the following: MA 114, 214, 222, 225, 303, 305, 341, 351, or 405, are required.

[3]Two courses (6 credit hours) of social sciences, one from each of two different university approved lists for Anthropology, Cultural Geography, Economics, Political Science, Psychology, or Sociology are required. Must be chosen from outside the student's major field of study.

[4]Any two courses in literature and/or history chosen from the university approved lists of Literature and/or History are required. At least one of these courses must also be on the university's approved list of courses of Non-English Speaking Cultures.

[5]Major requirements for the Bachelor of Science range from 27 to 30 credit hours in the major. Contact the department for a list of courses to be used to meet major requirements.

[6]Three hours of philosophy, exclusive of logic (LOG 201 and 335), are required.

[7]One of the following three-hour courses outside the student's major is required: music, history of art, dance (including the DAN 272/295 sequence) or multi-arts (including MDS 251, 252, 351) or a course in film (ENG 282 or 492, COM 364 or 374, MDS 496) or theatre (COM 103, 203, 213, 233, 243, 303, 313, 323, 333) or in religion (any REL course other than a Hebrew language course), rhetoric (COM 321/ENG 321 or COM 411/ENG 411) or classics (GRK/LAT 310).

[8]Certification of computer literacy through successful completion of HSS 100 (0 credit hours) is a graduation requirement of all majors in the College of Humanities and Social Sciences.

[9]One course (3 credit hours) selected from the university approved lists for Advanced Writing or Communication or a course in a foreign language (FL) at the 201 level or higher.

[10]One course (4 credit hours) in biological or earth science selected from the following list is required: BIO 125, BO 200, MEA 101/110, MEA 130/135.

[11]A 15-hour concentration is required in a mathematics, science, or engineering discipline. Student should consult with adviser.

[12]One three-credit course taken from the university approved lists of courses in Science, Technology and Society (Humanities and Social Sciences Perspectives list or Science and Technology Perspectives list). Courses selected to meet this requirement may not be used to fulfill any other requirement and may not be drawn from the student's major field of study or option.

## MINOR IN INTERNATIONAL STUDIES

Students who wish to add a significant international dimension to their departmental majors may pursue the Minor in International Studies. This program enables students to explore international topics, issues, and research from cross-cultural, transnational perspectives. The program provides tools that students can use to understand better the global context of the modern world and to learn the international dimensions of their chosen field of study.

## MINOR IN MUSIC

The College of Humanities and Social Sciences offers a Minor in Music to all undergraduate students in the university. The music minor is designed to foster creative thought, aesthetic understanding, and artistic self-expression. A total of 18 credit hours must be taken to complete this minor with emphasis in performance, theory/composition or history/literature. Students are expected to demonstrate their level of musical/intellectual accomplishment in a public recital or through submission of papers summarizing results of concentrated analysis and research from one or more courses. Students interested in the minor should refer to the music minor curriculum listed under the Department of Music.

## HONORS PROGRAMS

The College of Humanities and Social Sciences sponsors the Scholars of the College Program (part of the University Scholars Programs) for students who show exceptional academic promise. The participants in this residential program take special sections of freshman- and sophomore-level courses and participate in a series of cultural events and weekly forums. In their junior year they participate in special Junior Scholars seminars and attend monthly forums. For upper-level students, each department in the college offers an honors program designed to encourage outstanding students to develop their intellectual potential to the fullest extent possible through individualized study, special seminars, and close association with faculty members in their major field.

## SCHOLARSHIPS

In addition to the university-wide awards available, the College of Humanities and Social Sciences offers the following merit scholarships to entering freshmen:

J. Carlie Adams, Sr. Endowed Scholarship ($500)

Bess B. and Lynton Yates Ballentine Scholarship ($1000)

Frances W. and Gerald O. T. Erdahl Memorial Scholarship ($1000)

Other departmental scholarships include:

Claire Simmons Allan-Samson Memorial Scholarship in Moral Philosophy ($1000)

Mary M. Penney Scholarship in English ($1000)

For further information contact:

Dr. John Wall, Director, Honors/Scholars Program, College of Humanities and Social Sciences, North Carolina State University, Box 8105, Raleigh, NC 27695-8105

## PRE-LAW PROGRAM

Law schools neither prescribe nor recommend a particular undergraduate curriculum for prospective candidates. The Association of American Law Schools has, however, recommended an undergraduate education of the broadest possible scope as the best means of developing the communicative, critical, and creative skills and abilities fundamental to success in legal studies and practice. A student may prepare for post-graduate work in law in any of the majors offered by the eight degree-granting departments in the College of Humanities and Social Sciences. Alternatively, the student may elect the Concentration in Philosophy of Law (Department of Philosophy and Religion) or the Concentration in Law and Political Philosophy (Department of Political Science and Public Administration) or may

apply for admission to the Multidisciplinary Studies program during the sophomore year and, in consultation with an adviser, design a pre-law major involving two or more academic areas.

All interested entering freshmen are invited to attend a special orientation session for pre-law students. These students are also invited to join the Pre-law Student Association, an undergraduate organization that provides pre-law students with information concerning preparation for the law school admission test (LSAT) as well as the study and practice of law through guest speakers, discussion sessions, and other activities.

Consult A.S. Ugbaja, 515-5597 for more information.

## COOPERATIVE EDUCATION

Cooperative Education in humanities and social sciences seeks to broaden the student's intellectual horizons and at the same time to provide an introduction to the world of business, industry, government, or finance in preparation for a career after graduation. In this program the freshman and senior years are usually spent on campus while the sophomore and junior years are devoted either to alternate periods of on-campus study and off-campus work or to a parallel arrangement of part-time work and part-time study on a continuous basis. The student is paid for work experiences by the employer. Ordinarily the program takes five years to complete, but those who are willing to attend summer school or take on a summer co-op assignment can finish in four years. Transfer students are eligible, and all interested students are urged to apply early in the academic year. The program is also open to graduate students although less time is required on work assignments.

Further information may by obtained from Kim Proulx, Assistant Director, Cooperative Education, 212 Peele Hall, or (515-4421).

## JEFFERSON SCHOLARS IN AGRICULTURE AND THE HUMANITIES

The Thomas Jefferson Scholars Program in Agriculture/Life Sciences and the Humanities is a joint program of the College of Agriculture and Life Sciences and the College of Humanities and Social Sciences. It is a double degree which permits participants to have two concentrations: one in an area of agriculture/life sciences and one in an area of humanities/social sciences. The double degree program may be individually designed to meet each student's particular interests and career goals. The purpose of the program is to produce potential leaders in agriculture and the life sciences who have not only technical expertise but also an appreciation for the social, political, and cultural issues that affect decision-making.

Each spring a number of entering freshmen are chosen to receive scholarships to participate in the Jefferson program. In addition, other qualified students may choose to pursue a double major in agriculture/life sciences and the humanities under the Jefferson program.

Students interested in applying to the Jefferson Scholars program should contact Dr. James Oblinger, Associate Dean, College of Agriculture and Life Sciences, Box 7642, North Carolina State University, Raleigh, NC 27695 (515-2615) or Dr. Edward T. Funkhouser, Assistant Dean, College of Humanities and Social Sciences, Box 8101, North Carolina State University, Raleigh, NC 27695 (515-2467), before January 15.

## BENJAMIN FRANKLIN SCHOLARS PROGRAM

A limited number of freshmen in the College of Engineering are selected to participate in the Benjamin Franklin Scholars program. In addition to their major courses, each Benjamin Franklin Scholar develops an individualized, five-year plan of work focused on a central theme in the humanities and social sciences. Students completing the program receive a Bachelor of Science degree in an engineering discipline or computer science and a bachelor's degree in multidisciplinary studies.

This double-degree program, a joint undertaking of the College of Engineering and the College of Humanities and Social Sciences, provides a unique opportunity to integrate a solid base of knowledge in technology or science with the broad philosophical perspective of the humanities. The curriculum for the double-degree program has four main components: a strong general education, specially designed interdisciplinary and problem-defining courses, all technical course requirements associated with the engineering or computer science degree, and a 30-hour multidisciplinary concentration designed by students in consultation with their advisers. With careful planning, this program can be completed in five years.

For more information, contact the Assistant Dean for Academic Affairs, College of Engineering, 118 Page Hall, or the Assistant Dean for Undergraduate Affairs, College of Humanities and Social Sciences, 106 Caldwell Hall.

## ELI WHITNEY DOUBLE DEGREE PROGRAM IN TEXTILES AND INTERNATIONAL STUDIES

This joint program between the College of Textiles and the College of Humanities and Social Sciences allows a student to earn a B.S. in Textile and Apparel Management and a B.A. in Multidisciplinary Studies with a concentration in international studies. This dual degree is designed to prepare students for work in the

increasingly international textile industry. The program includes all the technical course requirements associated with the textile and apparel management degree. For the B.A. in Multidisciplinary Studies, students choose from among three areas of concentration: the Pacific Rim (language study in Japanese or Chinese), Latin America (language study in Spanish), or Europe (language study in German or Italian). The program, which takes four to five years to complete, also includes possible overseas internships. Merit scholarship awards are available for high-achieving students who participate in the double degree program in textiles and international studies. For more information, contact Dr. Gordon Berkstresser, Textile Management and Technology, 3404 Textile Building, (515-6593) or the Assistant Dean for Undergraduate Affairs, College of Humanities and Social Sciences, 106 Caldwell Hall, (515-2467).

## GIFFORD PINCHOT SCHOLARS PROGRAM

The Gifford Pinchot Scholars Program, a joint program with the College of Forest Resources, follows the model established by the Jefferson, Franklin and Whitney Programs. Academically talented students are invited to pursue simultaneously a B.S. degree in Forest Management through the College of Forest Resources and a B.A. degree in a major in Humanities and Social Sciences through the College of Humanities and Social Sciences. The Pinchot Scholars Program is limited to a small number (10 or fewer per year) of highly qualified and motivated students. Scholarship support is available to some participants in the Pinchot Scholars Program.

Pinchot Scholars follow the requirements for the B.S. in Forest Management (with one exception: the physics sequence PY 211-212 is not required). For the B.A. degree, they follow a 30-hour major concentration in multidisciplinary studies. Included in this major are two core requirements: MDS 340 Perspectives in Agricultural History (3 credits) and MDS 498 Senior Thesis (3 credits). Participants also complete an additional MDS seminar (1 credit). In addition, Pinchot Scholars complete all the general education requirements for a B.A degree in the College of Humanities and Social Sciences. A total of 155 credit hours is required for the double degree which students can complete in four and a half years.

The theme of the multidisciplinary studies major will involve placing forest management in the context of cross-cultural perspectives, global issues, and public policy. The exact set of courses that will constitute the major will be determined by students in consultation with their advisory group, subject to the approval of the Multidisciplinary Studies Committee. Each student is assigned an advisory group

consisting of an academic advisor from each college, plus a mentor from the forest industry. Pinchot Scholars also participate in existing cooperative activities with other double-degree program scholars. For more information, contact the Associate Dean for Academic Affairs, College of Forest Resources, 1022-N Biltmore, Box 8001 or the Assistant Dean for Undergraduate Academic Affairs, College of Humanities and Social Sciences, 106 Caldwell, Box 8101.

## DaVINCI SCHOLARS PROGRAM

The DaVinci Scholars Program is a joint program between the College of Humanities and Social Sciences and the School of Design. Students completing the DaVinci Scholars Program will earn two degrees within five or six years: a bachelor's degree in one of the five undergraduate disciplines in the School of Design and a B.A. or B.S. degree in the College of Humanities and Social Sciences. DaVinci Scholars will earn their first degree in design with no adjustment in their design requirements. They will elect a second major from any of those available in the College of Humanities and Social Sciences, including Multidisciplinary Studies. They must meet all requirements for both degrees.

The primary purpose of the double degree program is to provide students with a strong liberal education as a complement to their professional degree study. In some cases, however, students will also improve their employment opportunities by selecting study that directly supports their professional in design. For example, students majoring in graphic design who take a second degree that focuses on writing improve their opportunities for employment in communications. A student in architecture with a second degree in history may improve opportunities for graduate study in architectural history, preservation, or urban planning. Study of foreign language may improve opportunities for international design practice.

Students who wish to participate in the DaVinci Scholars should apply to the Associate Dean of the School of Design within their first semester of study in the School of Design and by the time of formal declaration of major in their second semester of study. DaVinci Scholars will participate in special programs and meet as a group for regular discussions and advising. Interdisciplinary seminars led by School of Design and College of Humanities and Social Sciences faculty will focus on issues relevant to the nature of the disciplines. Other programs may include lectures and field trips. Depending on the availability of funds, DaVinci scholars will receive scholarships toward participation in the program.

## FOLGER INSTITUTE

North Carolina State University is a member of the Folger Institute of Renaissance and Eighteenth-Century Studies, a unique collaborative enterprise sponsored by the Folger Shakespeare Library in Washington, D.C., and 20 universities in the Middle Atlantic region. Each year the institute offers an interdisciplinary program in the humanities—seminars, workshops, symposia, colloquia, and lectures. Admission is open to faculty and students of North Carolina State University, and a limited number of fellowships are available through the campus Folger Institute Committee.

# DEPARTMENT OF COMMUNICATION

Winston Hall, Room 201

R. M. Entman, *Interim Head of the Department*

D. A. DeJoy, *Interim Assistant Head of the Department*

P. N. Long, *Coordinator of Advising*

*Professors:* L. R. Camp, R. M. Entman, W. J. Jordan, L. W. Long, R. L. Schrag; *Professors Emeriti:* W. G. Franklin, C. A. Parker; *Associate Professors:* P. C. Caple, D. A. DeJoy, E. T. Funkhouser, V. J. Gallagher, M. Javidi, R. Leonard, H. E. Munn Jr., B. L. Russell; *Assistant Professors:* T. Hallett, M. Johnson, N. H. Snow; *Lecturers:* J. Alchediak, C. R. Branker, T. J. Kauffman, P. N. Long, M. F. Pandich, S. Stein; *Teaching Technician:* J. Willard.

The Bachelor of Arts in Communication program provides study and training in human communication for professionals entering business, industry, non-profit organizations, or government service. Today, many organizations are seeking graduates with demonstrated competencies in human communication to fill positions which require constant and skillful contact with a wide variety of internal and external publics. Depending upon their area of specialization, graduates may find employment opportunities as communication consultants, media specialists, trainers, public relations specialists, therapists, or performers. Many graduates choose to enter graduate or law schools.

## PROGRAMS OF STUDY

The Communication major calls for successful completion of at least 36 semester credit hours of Communication (COM) courses. Three of these courses, COM 110, COM 112, and COM 190, totaling nine semester credit hours, are completed by all students majoring in Communication. The remaining credit hours in the major come

from courses completed in one or more of the following concentrations offered by the Department of Communication:

**Communication Disorders:** The undergraduate portion of preparation for Speech-Language Therapist or Audiologist careers. A Master's degree is required for entry into these professions.

**Mass Communication:** A broad curriculum in the structure, operation, and social effects of the mass media in the United States with emphasis on electronic media, including courses in broadcast and non-broadcast media writing and production, media criticism, and media history.

**Public and Interpersonal Communication:** A curriculum emphasizing analytical and skills approaches to the study of human communication processes and problems.

**Public Relations:** Instruction in the communication theories and methods applied by organizations to establish and maintain mutually beneficial relationships with employees, governments, stock holders, and other publics.

**Theatre:** Studies in stage directing, acting, scenic and lighting design, and stagecraft. African-American dramaturgy and children's touring theatre are special features of this program. Courses are taught at Thompson Theatre on the NC State campus.

## COMMUNICATION HONORS PROGRAM

The honors program in Communication provides academically talented students an opportunity to expand their curriculum and abilities through in-depth, guided study. Candidates for the program must have achieved junior standing with a TGPA of at least 3.250 and a minimum 3.500 GPA in the minor after completion of at least nine credits of Communication courses.

Students admitted to the program must complete a total of nine credit hours in at least two of the following three types of courses: COM 300 and 400-level honors or honors contract courses, COM 500-level courses and an Honors senior thesis seminar (3 credits). Honors students will select and work closely with an honors faculty adviser.

Students who complete a plan of study meeting the above requirements and graduate with a minimum TGPA of 3.250 and a GPA for Communication courses of at least 3.500 will have successfully completed the Communication honors program. Completion of the program will be noted on the student's transcript and diploma, and in the commencement and honors convocation programs.

## CURRICULUM NOTES

- Students must enroll in COM 190 during their first semester as a Communication major.
- A student must have completed 15 hours at NC State with a minimum overall GPA of 2.700 to transfer upon request from another NC State curriculum into the Communication major. Students with GPAs less than 2.700 but above 2.000 may apply for admission to the major. Two application periods are scheduled each year. Contact the department for an application form and deadline information.
- No final grades below "C" are permitted for courses used in the Communication major.
- To qualify for graduation, each student must have a minimum GPA of 2.000 for all courses completed at NC State, and at least a 2.000 GPA for all courses taken in the Communication major.
- COM 146, Business and Professional Communication, is intended for students in majors other than Communication. Students majoring in Communication may not use this course to satisfy any requirement within the 36-credit-hour major.

## MINORS

A minor in Theatre is offered. Also, the Communication department and the departments of English and Multidisciplinary Studies jointly offer a Film Studies minor. Literature detailing the requirements for these minors is available at the main department office. Those interested in the Journalism minor at NC State should contact the English department.

## INTERNSHIPS

The department operates an internship program which offers qualified Seniors the opportunity to gain work experience in the Communication field. The internship is required of all students in the Public Relations concentration, but students from the other Communication concentrations may also participate in this program.

## FURTHER INFORMATION

Those interested in studying Communication at NC State are encouraged to visit the department's web site at: http://www2.ncsu.edu/ncsu/chass/communication/

An appointment with the communication department's coordinator of advising is also recommended. To reach the Communication department, you may call (919) 515-2450, fax (919) 515-9456, or write to Box 8104, NCSU, 27695-8104.

# DEPARTMENT OF ENGLISH

Tompkins Hall, Rooms 131, 246

T.D. Lisk, *Head*

L.T. Holley, *Associate Head*

W.E. Meyers, *Assistant Head for Scheduling*

P.R. Cockshutt, *Coordinator of Advising*

H.C. West, *Director of Graduate Programs*

J. Ferster, *Director of the Freshman Program*

*William C. Friday Distinguished Professor*: Walt A. Wolfram; *Alumni Distinguished Undergraduate Professor*: M.T. Hester; *Professors*: B.J. Baines, G.W. Barrax, J.W. Clark, J. Ferster, J.A. Gomez, J.M. Grimwood, A.H. Harrison, M.T. Hester, L.T. Holley, J.J. Kessel, L.H. MacKethan, W.E. Meyers, C.R. Miller, C.A. Prioli, M.S. Reynolds, L. Smith, J.J. Smoot, A.F. Stein, J.N. Wall Jr., W. Wolfram, R.V. Young; *Professors Emeriti*: P.E. Blank Jr., L.S. Champion (Alumni Distinguished Undergraduate Professor), J.D. Durant, M. Halperen, H.G. Kincheloe, A.S. Knowles, B.G. Koonce, F.H. Moore, M.C. Williams, P. Williams Jr.; *Associate Professors*: E.Y. Amiran, L.J. Betts, M.P. Carter, D.H. Covington, A.M. Davis-Gardner, C. Gross, D. Herman, S.B. Katz, M.F. King, R.C. Kochersberger, R.C. Lane, D.L. Laryea, J.E. Morrison, C. Nwankwo, M.E. Orr, A.M. Penrose, J.O. Pettis, L.R. Severin, J.J. Small, J.F. Thompson, H.C. West, D.B. Wyrick; *Assistant Professors*: C. Haller, N. Halpern, W.E.Haskin, S.M. Katz, D.E. Keetley, L. May, B. Mehlenbacher, J.D. Morillo, M. Pramaggiore, S.M. Setzer, K. Shepherd-Barr, E. Thomas, C. Warren, T. Weldon; *Senior Lecturer*: P.R. Cockshutt.

The Department of English offers basic and advanced courses in writing, language, and literature. The freshman courses, required of all undergraduate students, develop skill in expository writing and in analytical reading of literary and non-literary works. Advanced courses in writing available to all students cover a variety of areas, including journalism, technical and business writing, and creative writing. These courses give students opportunities to pursue special personal and career interests, as do courses in literature, linguistics, film, and folklore.

The department offers a Bachelor of Arts major in English with four options: language and literature; world literature; rhetoric, writing, and language; and teacher education. It also offers a Bachelor of Science major.

Internships available to qualified students provide practical experience as well as an understanding of how academic studies are relevant to the workplace.

In addition, the department offers two graduate degrees: a Master of Arts in English and a Master of Science in Technical Communication. (See *Graduate Catalog* for details.)

A five-course certificate program in Professional Writing, available to students not seeking a degree at NC State, offers preparation in practical writing and editing, including both journalism and technical writing.

## OPPORTUNITIES

A degree in English provides both liberal education and practical knowledge about the role of writing and language in the everyday world. It leads to careers in such fields as teaching, journalism, advertising, public relations, personnel management, technical writing, business writing, and creative writing. It sharpens the analytical and interpretive skills needed for professional and managerial careers, and it serves as an excellent preparation for students planning to study law or medicine and for those intending to do graduate work in literature and rhetoric.

## ENGLISH HONORS PROGRAM

The Honors Program in English provides courses that enrich the intellectual life of the English major. The Honors student contributes to and learns from seminar settings, takes up the obligation of independent study, produces documents representing sustained and logically articulated research practices, and earns recognition for excellent work beyond ordinary requirements.

For admission, students must have a minimum GPA of 3.000, must have completed at least three English courses above the freshman level with a minimum GPA of 3.250. Successful completion of the Honors Program requires completion of 9 hours of honors courses with grades of A or B, a GPA of at least 3.400 in NC State English courses and a minimum overall GPA of 3.250.

## BACHELOR OF ARTS IN ENGLISH

**Major in English, Language and Literature Option**--The student must schedule 42 semester hours beyond the usual six hours in freshman composition. A core of 24 hours, including Introduction to Literary Studies, is required of all majors. Beyond these courses, the student may pursue special interests within the limits of recommended categories.

**Major in English: World Literature Option**--The Student must schedule 42 semester hours beyond the usual six hours in freshman composition. At least 21 of these hours must consist of ENG or ENG/FL courses; at least 12 of them must consist of FL- or ENG/FL courses. A core of 33 hours, including Introduction to Literary

Studies, meets requirements for courses in periods, regions, and methods. Students must achieve proficiency in a foreign language, usually at the 300 level. The Lawrence Rudner Option in World Literature enables students to achieve a fully-rounded education in literature by mixing courses in English and American literature with courses in foreign-language literatures.

**Major in English: Rhetoric, Writing, and Language Option**--The student must schedule 42 semester hours beyond the usual six hours in freshman composition. For their 18 hours of English electives, students choose at least 6 hours in concepts and theories and 6 hours in practical applications, with an additional 6 hours in either area. This combination allows students to learn how to write and design documents for specific uses, to understand why strategies work, and to develop resources for solving new problems. With appropriate electives and a choice of a minor, students may prepare for careers in journalism, technical writing, information services, or creative writing or may enter graduate study in these areas or in rhetoric and composition.

**Major in English, Teacher Education Option**—English majors may enroll in the Teacher Education Option offered by the College of Humanities and Social Sciences in cooperation with the College of Education and Psychology. Students who complete this program are eligible to apply for the certification to teach English in secondary schools in North Carolina. The requirements of the program include 33 semester hours in professional courses and 36 semester hours in English beyond the usual six hours in freshman composition (total 128 credit hours required for graduation). Students desiring to enter this program should declare their intention before the spring of the sophomore year. Students are required to file a formal application for admission which must be approved in order for them to participate. Enrollments in the Teacher Education Option may be limited.

## BACHELOR OF SCIENCE IN ENGLISH

**Major in English**—Students, in consultation with their departmental advisers, must schedule 30 semester hours beyond the usual six hours in freshman composition.

## MINOR IN ENGLISH

The Department of English offers a Minor in English to majors in any field except English.

To complete the minor, fifteen hours of English courses are required above the 100 level, six hours of which must be at the 300 level or above and at least three hours at the 400 level or above.

A grade of C or better is required in all courses credited to the minor.

## MINOR IN FILM STUDIES

The Departments of English and of Communication and the Division of Multidisciplinary Studies offer a Minor in Film Studies. The minor provides an introduction to the nature of the film experience, some background in the history of the medium, and the opportunity for in-depth study of selected topics.

Fifteen hours of course work are required to complete the minor: ENG 282 and either COM 364 or COM 374, plus nine credit hours selected from the following: ENG 382, ENG 492, COM 244, COM 364 or 374 (whichever course was not taken to fulfill the requirement above), MDS 496, HI 336, and DN 316 (prerequisite waived, consent of instructor). Any students taking this minor cannot count courses from the minor toward their majors.

## MINOR IN JOURNALISM

With the Department of Communication, the Department of English offers a Minor in Journalism, open to students in any major. It consists of the following courses: ENG 214, ENG 215, ENG 315, COM 204, and one of the following: COM 234, COM 334, COM 421. A grade of C or better is required in all courses.

## MINOR IN LINGUISTICS

The Department of Foreign Languages and Literatures and the Department of English offer a Minor in Linguistics to majors in any field. Among students likely to be attracted to the minor are those interested in second language acquisition.

To complete the minor fifteen hours of designated courses are required, as well as the completion of a foreign language through the 202 level.

## MINOR IN WORLD LITERATURE

The Departments of English and of Foreign Languages and Literatures offer a Minor in World Literature to all undergraduate students.

It requires six courses: FL 350, CL 495, and four courses in one or more literatures (other than a student's major) chosen from an approved list. A grade of C or better is required in all courses.

# DEPARTMENT OF FOREIGN LANGUAGES AND LITERATURES

1911 Building, Room 117

J.H. Stewart, *Head*

A.C. Malinowski, *Assistant Head*

A.B. Kennedy, *Coordinator of Advising*

G.G. Smith, *Scheduling Officer*

*Professors:* T.P. Feeny, G. F. González, J.R. Kelly, G.G. Smith, J.H. Stewart, M.A. Witt; *Professors Emeriti:* A.A. González, M. Paschal, G.W. Poland, E.M. Stack; *Associate Professors:* R.A. Alder, S.T. Alonso, H.G. Braunbeck, G.A. Dawes, M.M. Magill, A.C. Malinowski, D.M. Marchi, L.A. Mykyta, Y.B. Rollins, M.L. Salstad, S.E. Simonsen, M.L. Sosower; *Associate Professors Emeriti:* W.M. Holler, V.M. Prichard, H. Tucker Jr.; *Assistant Professors:* V. Bilenkin, M.D. Garval, J.M. Levis, A. Martín, J.P. Mertz, G. P. Meyjes, G. Williams; *Lecturers:* D.F. Adler, A.B. Kennedy, S. Navey-Davis, Q.Q. Sun, A. Taj; *Instructor:* J.S.D. Despair.

## OPPORTUNITIES

The expansion of international relations makes the knowledge of foreign languages a critical need for today's professional. The student of foreign languages is not limited to teaching, translating or interpreting. There are careers in politics, diplomacy, commerce, banking, agriculture, science, and research in which a thorough knowledge of foreign languages is crucial for success. The demand for multilingual personnel extends to all fields of human enterprise and will continue to grow in the coming years.

## BACHELOR OF ARTS IN FRENCH OR SPANISH

All the general requirements for the Bachelor of Arts degree must be met, including six hours of literature survey within the Department of Foreign Languages and Literatures or in British and American literature or any combination of these. Degree designations are B.A. in French Language and Literature, B.A. in Spanish Language and Literature, B.A. in French Language and Literature with Teacher Education Option, and B.A. in Spanish Language and Literature with Teacher Education Option.

Outstanding students may become members of the Alpha Lambda chapter of Phi Sigma Iota, National Foreign Languages Honor Society; of the Xi Omicron chapter of Sigma Delta Pi, National Hispanic Honor Society; and of the Gamma Alpha

chapter of Debra Slav., National Slavic Honor Society. A departmental honors program in French and Spanish is also available to eligible students.

**Major in French or Spanish**—Students must complete 36 hours beyond the 201 level, including a senior seminar/capstone course. Majors must take 12 additional hours of advised electives. These are waived for students who choose to double major (in Business Management or Political Science, for example), and for those who choose the Teacher Education Option.

**Major in French or Spanish with Teacher Education Option**—In collaboration with the College of Education and Psychology and the Department of Curriculum and Instruction, the Department of Foreign Languages and Literatures offers a program leading to a French or Spanish teaching license in North Carolina, grades K-12.

The requirements of the program include 30 semester hours in professional education classes and 39 semester hours in French and Spanish beyond the 102 level. Candidates must consult with their academic adviser as early as possible for the proper planning of their curriculum. Application for admission to teacher education candidacy is made during the spring semester of the sophomore year.

## FOREIGN LANGUAGES AND LITERATURE HONORS PROGRAM

The Honors Program in Foreign Languages and Literatures assists academically talented majors to realize their fullest potential as undergraduates in the field. To participate, students must have a TEPA of 3.000+ and SPA of 3.250+ after 9 hours in the major.

Successful completion of the program requires an overall GPA of 3.250+, with 9+ hours of Honors work, at least 6 of them in Foreign Languages and Literatures.

Students will extend their critical thinking skills, refine foreign language skills, and discover significant scholarly areas of particular interest to them through various avenues, such as: Honors options in regular classes, in which students explore the material in greater depth or breadth; development and execution of an independent project, assisted by a faculty mentor and; an approved study abroad project.

Completion of departmental Honors is noted on the student's transcript and diploma and at Commencement.

## PROGRAMS ABROAD

Summer study programs are offered in Austria, France, Germany, and Mexico, and a semester-long program in Spain.

## MINOR IN CLASSICAL STUDIES

The Minor in Classical Studies offers an excellent foundation for advanced work in other academic disciplines as well as professional programs in law, medicine and finance. The minor gives students an opportunity to develop a keener perception and better understanding of the cultural forces at work in the contemporary world. And by presenting a broad selection of courses in the various disciplines of literature, philosophy and history, the minor provides students with a sound introduction to studies in antiquity.

Requirements for the minor include five courses selected from the following: GRK 201 or LAT 201; GRK 310 or GRK 320; PHI 300 or REL 312; HI 403 or HI 404; and HI 405 or 406.

## MINORS IN FOREIGN LANGUAGES, LITERATURES, AND CULTURES

Minor programs in the Department of Foreign Languages and Literatures include courses in language, literature, and civilization.

The minor program requires 15 hours of study in Chinese, French, German, Italian, Japanese, Russian, or Spanish, beginning at the 201 level; in Classical Greek, beginning at the 101 level.

Undergraduate students majoring in any area of study at NC State are eligible to minor in a foreign language. Students may not, however, major and minor in the same language.

## MINOR IN JAPAN STUDIES

Students who take a Minor in Japan Studies are required to complete, with a grade of C or better, 18 hours of courses distributed as follows: Tested language competence through FLJ 202, with at least six hours of Japanese language instruction at NC State at or above the FLJ 201 level and four of the following cognate courses: EC 470; ENG/FL 394; HI 263; HI 472; PS 342; PS 346; MDS 295. With the Minor adviser's approval, additional Japan-related classes may be used to fulfill the cognate course requirement.

## MINOR IN LINGUISTICS

(See Department of English)

## MINOR IN WORLD LITERATURE

(See Department of English)

# DEPARTMENT OF HISTORY

Harrelson Hall, Room 162

J.M. Riddle, *Head*

J.E. Crisp, *Assistant Head*

D.A. Zonderman, *Coordinator of Advising*

Gail O'Brien, *Director of Graduate Programs*

*Alumni Distinguished Undergraduate Professor Emeritus:* B.F. Beers; *Alumni Distinguished Undergraduate Professors*: J.P. Hobbs, J.M. Riddle; *Alumni Distinguished Professor* (for graduate teaching): J.D. Smith; *Professors*: J.R. Banker, C.H. Carlton, A.J. De Grand, D.P. Gilmartin, W.C. Harris, J.P. Hobbs, A.J. La Vopa, L.O. McMurry, G.W. O'Brien, J.K. Ocko, S.T. Parker, J.M. Riddle, R.H. Sack, R.W. Slatta, J.D. Smith, E.D. Sylla, K.S. Vincent; *Professors Emeriti:* M.L. Brown, M. S. Downs, R.W. Greenlaw, D.E. King, L.W. Seegers, M.E. Wheeler, B.W. Wishy; *Associate Professors:* J.E. Crisp, W.A. Jackson, O.J. Kalinga, W.C. Kimler, K.P. Luria, S. Middleton, J.A. Mulholland, S.L. Spencer, G.D. Surh, P. Tyler, K.P. Vickery; *Associate Professor Emeritus:* R.N. Elliott; *Associate Members of the Faculty:* F.A. Moyer, R.B. Mullin; *Assistant Professors:* H. Brewer, A.F. Khater, M.Kim, A. Mitchell; *Adjunct Assistant Professors:* V.L. Berger, J.W. Caddell, J.C. Cashion, J.J. Crow, H.E. Mattox, D.J. Olson, W.S. Price Jr., H.K. Steen; *Lecturer:* J. Woodard

An understanding of the historical background of our times is expected of the educated person. The Department of History makes it possible for students to gain this understanding through a wide range and variety of courses at all levels from introductory through graduate.

A broad offering of introductory courses is available to satisfy the undergraduate history requirement or part of the humanities and social sciences requirements in most university curricula. Students in the College of Humanities and Social Sciences are required to take two courses in history—one dealing with a culture significantly different from our own in pre-industrial Western or non-Western societies and the other dealing with our own culture in the United States or post-industrial Western societies.

Honors students are eligible for membership in Phi Alpha Theta, the national history honorary society. Some introductory and advanced undergraduate courses and graduate courses are offered in the evening.

The department offers two Master of Arts degrees. Students interested in enhancing their understanding of history, obtaining advanced teaching credentials, or pursuing doctoral work elsewhere may take the traditional graduate program. Students

interested in applied history may take the public history program. Some financial assistance is available.

## OPPORTUNITIES

A history major has traditionally served as a foundation for careers in such professions as teaching and law. In recent years undergraduates have frequently augmented studies in history with computer science, foreign language, or business administration, combinations which have proved attractive in business and government service.

The prospect of new career ladders in public education has prompted renewed interest in an M.A. in history with advanced teaching certification. Multiplication of records of every kind has created a steady demand for historians with master's degrees in applied or public history.

## HISTORY HONORS PROGRAM

The departmental honors program in History allows selected students to pursue intensive, individually directed work in history. Students are invited to enter the honors program (usually in the junior year) if they have a cumulative GPA of at least 3.000. and a history GPA of a least 3.300, with a minimum of 9 history hours completed. Students must take 9 hours of individual, directed study (HI498, 495, 496) leading toward the writing of an Honors Thesis. Students must also take an extra history seminar (HI 491) and participate for two semesters in a non-credit honors reading seminar.

To graduate with honors in history, a minimum history GPA of 3.300 and an overall GPA of 3.250 is required. Graduating honors students receive recognition at commencement and an "honors" designation on their permanent record.

## BACHELOR OF ARTS IN HISTORY

**Major in History**—A history major must take 30 hours of course work in history in addition to the six hours required of all students in the College of Humanities and Social Sciences. These 30 hours must include a 491 seminar. At least 24 of the 30 hours must be at the 400 level. Sufficient courses are offered to complete the history requirements for the B.A. in the evening.

**Major in History with Social Studies Teacher Education Option**—History majors may enroll in the teacher education program offered by the College of Humanities and Social Sciences in cooperation with the College of Education and

Psychology. Students who complete this program are eligible for certification to teach social studies in secondary schools in North Carolina.

In addition to the Bachelor of Arts degree requirements, students are required to take professional courses in education and psychology and additional social sciences courses (126 credit hours required for graduation). Students desiring to enter this program should declare their intention during their sophomore year. Admission is competitive and the limited in Teacher Education Option programs.

### BACHELOR OF SCIENCE IN HISTORY

A Bachelor of Science in History involves 27 hours of course work, with 15 hours at the 400 level, including an HI 491 seminar.

### MINOR IN HISTORY

A Minor in History shall consist of six courses in history; one introductory course in pre-industrial or non-Western history (i.e., HI 207, 208, 209, 215, 216, 263, 264, 275, or 276); one introductory course in United States or post-industrial Western history (i.e., HI 205, 210, 221, 222, 233, 251, or 252); four three-hour courses in history at the 300 level or above, two of which must be at the 400 level.

All six courses must be completed with a grade of C or better to satisfy the requirements of the minor.

## DIVISION OF MULTIDISCIPLINARY STUDIES

2806 Hillsborough Street

C.D. Korte, *Head and Director of Graduate Programs*

P.W. Hamlett, *Assistant Head*

*Professors:* D.B. Greene, C.D. Korte; *Professors Emeriti:* D.A. Adams, A.C. Barefoot; *Associate Professors:* P.W. Hamlett, R.L. Hoffman, R.A. Waschka II; *Assistant Professors:* B.H. Grimes, J. Herkert; *Lecturers:* E. Malloy-Hanley, C.L. Stalnaker.

*Multidisciplinary Studies Degree Committee:*
J.A. Mulholland, *History*
A.C. Malinowski, *Foreign Languages and Literatures*
M.S. Thompson, *Sociology and Anthropology*
T.L. Honeycutt, *Computer Science*
C.B. Kimbrough, *Business Management*
C.L. Stalnaker, *Multidisciplinary Studies, Chair*

Multidisciplinary Studies is an academic unit responsible for interdisciplinary programs dealing with contemporary and historical issues and problems. Courses are often taught by teams of faculty drawn from the division and from the academic disciplines relating to the problems or issues under consideration. These courses are open to students in all curricula. In addition, the Social Work Program is administered as part of the Division of Multidisciplinary Studies.

## BACHELOR OF ARTS AND BACHELOR OF SCIENCE IN MULTIDISCIPLINARY STUDIES

The Multidisciplinary Studies program allows students to design their own academic majors. Instead of following the requirements for a major in one of the traditional disciplines, the candidate for the Bachelor of Arts or Bachelor of Science degree in Multidisciplinary Studies has the responsibility of organizing a concentration or field of specialization from one or more disciplines. A concentration in Latin American Studies might, for example, combine related courses in language, literature, history, economics, sociology, and political science.

The freshman and sophomore basic requirements for the multidisciplinary studies program are the same as for the other Bachelor of Arts and Bachelor of Science programs in humanities and social sciences. In satisfying basic requirements in language, humanities, social science, mathematics, and natural science, students should, whenever possible, choose those courses that are most appropriate as background for the courses in their major concentrations.

## ADMISSION TO THE PROGRAM

To become candidates for a major in multidisciplinary studies, students must first get application forms and information from the office of the Division of Multidisciplinary Studies, 2806 Hillsborough Street and then prepare a tentative proposal which includes a list of courses comprising 30 credit hours for the B.A. and 27 credit hours for the B.S. and an essay of 500 words explaining the reasons for making this set of courses the field of specialization. The student's proposal is reviewed by a faculty sponsor and submitted to the Multidisciplinary Studies Degree Committee for consideration.

After a thorough examination to determine whether the set of courses proposed as a multidisciplinary major is academically sound and coherent, the committee will

recommend that the Dean of Humanities and Social Sciences accept the proposals, or they will be sent back to the students and their sponsors with suggestions for modification and resubmission.

## MULTIDISCIPLINARY STUDIES HONORS PROGRAM

The Honors Program in Multidisciplinary Studies provides able students the opportunity to integrate the various strands of their concentrations in a capstone project. The program also provides a context in which students can sharpen their thinking on the unique challenges and opportunities of interdisciplinary work.

To be admitted into the MDS Honors Program, students must have earned nine credit hours in their MDS concentrations, have an overall GPA of 3.000 and a major GPA of 3.250.

To graduate with Honors in MDS students must have a GPA of 3.250, and must have completed the MDS capstone course, " Independent Studies for MDS Honors Students," and have earned six additional credit hours in courses that are both Honors courses and also part of their MDS concentrations.

## MINOR IN AFRICAN-AMERICAN STUDIES

The Minor in African-American Studies provides a comparative and interdisciplinary study of the Black experience in Africa and the Americas. Three required courses include an Introduction to African-American Studies (MDS 240), Black American Literature (ENG 248), and Afro-American History (HI 372 or 373). Two elective courses may be selected from a list of designated courses in such disciplines as anthropology, history, language, sociology, social work, and communication. The minor is designed to bring together students from diverse backgrounds and curricula who share a common interest in the African-American experience.

## MINOR IN ARTS STUDIES

The Minor in Arts Studies is open to all undergraduate majors in the university. This interdisciplinary minor is designed to enrich the student's university experience, to serve as a foundation for learning and understanding in the arts beyond the university years, and to stimulate intellectual development in ways that may reinforce or complement the objectives of the student's major. This minor provides the student with a fundamental understanding of the historical, theoretical, and practical disciplines of the arts.

A total of eighteen credit hours must be taken to complete this minor. Students interested in the minor should refer to the Arts Studies courses listed under "Arts

Studies" in the course description section of this catalog. These courses are described in detail under their departmental prefixes.

## MINOR IN ENVIRONMENTAL SCIENCE

This minor provides an opportunity for non-science majors to acquire basic understanding of the interrelationships between humans and the environment. It includes natural and social science courses that help to integrate disciplines and provide the foundation for analyzing environmental issues.

## MINOR IN FILM STUDIES

(See Department of English)

## MINOR IN SCIENCE, TECHNOLOGY, AND SOCIETY

The Minor in Science, Technology, and Society is a fifteen-hour, multidisciplinary minor providing students an opportunity to appreciate and understand better the roles that science and technology play in the larger sociocultural context. A goal of the minor is to help students develop the ability to order and integrate the diverse aspects of their educations.

Two essential components of this ability are sensitivity to the moral dimensions of scientific and technological inquiry as affecting how people may live or want to live and an appreciation of the practical implications of scientific and technical theory. In addition, the Minor in Science, Technology, and Society enables students to increase the breadth of their familiarity with science and technology.

## MINOR IN WOMEN'S STUDIES

The Women's Studies Minor provides all students in the university the opportunity for interdisciplinary study in women's gender issues from a wide variety of cultures, backgrounds and historical eras. In addition, it introduces the often unacknowledged contributions made by women in various fields of endeavor through course offerings in nine departments, the undergraduate minor helps students to examine common assumptions about gender relations using feminist theory and methodologies across disciplinary boundaries.

# DEPARTMENT OF PHILOSOPHY AND RELIGION

Winston Hall, Room 101

T.H. Regan, *Head*

D.F. Austin, *Assistant Head*

M.K. Cunningham, *Coordinator of Advising*

*Alumni Distinguished Undergraduate Professors:* W.R. Carter, T.H. Regan; *Professors:* W.R. Carter, J.Levine, E.A.Martin, C.M. Pierce, T.H. Regan, A.D.VanDeVeer; *Professors Emeriti:* P.A. Bredenberg, R.S. Bryan; *Associate Professors:* W. Adler, D.F.Austin, M.K.Cunningham, R.M. Hambourger, D.M.Jesseph, B.B.Levenbook, H.D.Levin, R.B.Mullin, R.O.Savage, T.K.Stewart; *Associate Professors Emeriti:* W.C. Fitzgerald, W.L.Highfill, R.S.Metzger; *Assistant Professors:* D.D. Auerbach, J.W. Carroll, T.J. Hinton, R.M Jaffe, C.L. Miller

Philosophy and Religious Studies confront the most important questions with the most rigorous standards, relying on over two millennia of accumulated wisdom from the best minds. They provide excellent training for any line of work where there's value in the ability to think straight and express oneself clearly -- virtually every line of work. Law school, medical school and other professional school admission boards know this. A double major in this department and another (e.g., political science for law, biochemistry for medicine) can make an applicant very attractive to a professional school.

Majors receive excellent training for graduate school in Philosophy or Religious Studies, as is shown by the department's record in placing graduates in top graduate programs in each field.
The Department of Philosophy and Religion is located on the World Wide Web at: http://www2.ncsu.edu/ncsu/chass/philo/

## SCHOLARSHIP

The Claire Simmons Allan-Samson Memorial Scholarship in Moral Philosophy, a renewable scholarship of $1000 per year, will be awarded annually to worthy students who have expressed an interest in issues in animal rights.

## OPPORTUNITIES

For students interested in postgraduate study, information compiled by post-college professional schools reveals that undergraduate majors in philosophy and religion who apply to graduate schools of management have in the past scored extremely

well in combined total scores on the Graduate Management Admission Test, with exceptional scores on verbal fields.

Those undergraduate philosophy majors who apply to law schools have been shown to be more likely to be admitted than virtually any other field represented.

Students intending to study philosophy and religion in graduate programs have consistently scored much higher than other students on the verbal section of the Graduate Record Examination. Because of this capability of scoring so well on the various postgraduate tests, many businesses and industries welcome philosophy and religion majors into their training programs.

## PHILOSOPHY HONORS PROGRAM

The honors program in Philosophy offers an enriching and challenging educational experience to qualified majors.

Admission to the program requires junior standing, completion of nine hours in the major, and a 3.250 GPA overall and in the major. Honors students must complete at least nine credit hours of honors option course work in Philosophy (including PHI 335 and PHI 498) and write an honors thesis (PHI 498) to be evaluated by the instructor for PHI 498 and one other member of the Philosophy faculty. Graduation requires a 3.250 GPA overall and in the major.

Successful completion of the program is noted on the student's transcript and diploma, and in the commencement and honors convocation programs.

## RELIGIOUS STUDIES HONORS PROGRAM

The honors program in Religious Studies guides outstanding majors in independent, critical inquiry of the academic study of religion.

Admission to the program requires junior standing, completion of nine hours in the major, and a 3.250 GPA overall and in the major. Honors students must complete at least nine credit hours of honors option course work in Religious Studies (including at least one 400-level course) and write an honors paper as part of an independent study course (REL 498) which is evaluated by an honors committee.

Graduation requires a 3.250 GPA overall and in the major. Successful completion of the program is noted on the student's transcript and diploma, and in the commencement and honors convocation programs.

## BACHELOR OF ARTS IN RELIGIOUS STUDIES

Candidates for the Bachelor of Arts in Religious Studies must complete 33 credit hours in the major. The courses in religious studies must include one course in

Western religious traditions (REL 317, 320, 323, 326, 327); one course in non-Western religious traditions (REL 331, 332, 407, 408); one course in Biblical Studies (REL 202, 311, 312, 314; GRK 202); and a minimum of 9 hours of advanced studies (REL 402, 407, 408, 460, 471*, 481, 484, 496*, 498*).

* can be taken twice for credit

## BACHELOR OF ARTS IN PHILOSOPHY

Candidates for the Bachelor of Arts in Philosophy must complete 33 hours in philosophy, including the three hours in philosophy required of all CHASS students; either Logic (LOG 201) or Symbolic Logic (LOG 335); the courses in the development of Western philosophic thought (PHI 300 and 301); an introductory course in value theory (PHI 275 or 321); one advanced course in value theory (PHI 306, 309, 311, 313, 322); two courses in contemporary philosophy (PHI 330, 331, 332, 333); one-credit writing courses in each of three core areas of philosophy (PHI 494, 495 and 496); the seminar Writing and Research in Philosophy (PHI 497); and two additional philosophy courses (other than PHI 250).

**Major in Philosophy with a Concentration in Philosophy of Law** - The concentration requires 39 hours, with at least 27 hours in philosophy (in addition to either PHI 275 or PHI 321, which may be taken to meet college requirements) and at least 9 hours in political science. Three advised electives are required in addition to five core courses: PHI 309, PHI 312, PHI 313, PS 308, and PS 361. Four background courses (12 hours), and three writing courses (3 hours) must be taken: either Logic (LOG 201) or Symbolic Logic (LOG 335); the courses in the development of Western philosophic thought (PHI 300 and PHI 301); either PHI 331 or PHI 332; and one-credit writing courses in each of three core areas of philosophy (PHI 494, 495, 496).

## BACHELOR OF SCIENCE IN PHILOSOPHY

Candidates for the Bachelor of Science in Philosophy must complete 30 hours in philosophy, including the 3 hours in philosophy required of all CHASS students. These must include the courses in the history of Western philosophic thought (PHI 300 and PHI 301); Symbolic Logic (LOG 335); Philosophy of Science (PHI 340); an introductory course in value theory (PHI 275 or PHI 321); one advanced course in value theory (PHI 306, 309, 311, 313, 322); one course in contemporary philosophy (PHI 330, 331, 332, 333); one-credit writing courses in each of three core

areas of philosophy (PHI 494, 495 and 496); the seminar Writing and Research in Philosophy (PHI 497); and one additional philosophy course (other than PHI 250).

## MINORS IN THE DEPARTMENT OF PHILOSOPHY AND RELIGION

Students wishing to take any of the following academic minors need to complete the departmental form declaring intention to do so.

## MINOR IN JAPAN STUDIES

Students who take a Minor in Japan Studies are required to complete with a grade of C or better 18 hours of courses distributed as follows: Tested language competence through FLJ 202, with at least six hours of Japanese language instruction at NC State at or above the FLJ 201 level and four of the following cognate courses: EC 470; ENG/FL 394; HI 263; HI 472; PS 342; PS 346; MDS.

With the Minor adviser's approval, additional Japan-related classes may be used to fulfill the cognate course requirement.

## MINOR IN COGNITIVE SCIENCE

Students who take a Minor in Cognitive Science are required to complete with a grade of C or better fifteen hours of courses, distributed as follows: PSY 320 (Cognitive Processes); PSY 340 (Environmental Ergonomics) *or* PSY 546 (Human Information Processing); PHI 331 (Philosophy of Language); PHI 332 (Philosophy of Psychology); PHI/PSY 425/525 (Introduction to Cognitive Science).

## MINOR IN PHILOSOPHY

Students who take a Minor in Philosophy are required to complete with a grade of C or better fifteen hours of courses in selected fields in philosophy, including a course in the history of philosophy (3 credit hours), a course in normative (ethics and ethics-related) philosophy (3 credit hours), a course other than one in normative philosophy, but not including logic or the history of philosophy (3 credit hours).

## MINOR IN RELIGIOUS STUDIES

Students who take a Minor in Religious Studies are required to complete with a grade of C or better fifteen hours of courses in selected fields of religious studies. In order to ensure a wide study of the field, students are required to select at least one course in Western religious traditions and at least one course in non-Western religious traditions. REL 101 and REL 102 may not be counted in the minor.

# DEPARTMENT OF POLITICAL SCIENCE AND PUBLIC ADMINISTRATION

Caldwell Hall, Room 211

M.S. Soroos, *Head*

J.H. Svara, *Director of Master of Public Administration Program*

T. Inlow, *Coordinator of Advising*

*Professors:* C.K. Coe, G.D. Garson, M.S. Soroos, J.H. Svara, D.W. Stewart, J.O. Williams; *Professors Emeriti*: W.J. Block, A. Holtzman, E.R. Rubin; *Associate Professors*: D.M. Daley, R.H. Dorff, J.H. Gilbert, S.H. Kessler, J.M. McClain, R.S. Moog, E. O'Sullivan, T.V. Reid, J.E. Swiss, M.L. Vasu; *Associate Professors Emeriti*: H.G. Kebschull, K.S. Peterson; *Assistant Professors*: M.A. Dimock, C.E. Griffin, R.L. Korosec, A.J. Taylor; *Visiting Assistant Professors:* J.R. Horner, S.K. Straus; *Lecturers:* J.A. Delp, T. Inlow, P.M. Pavlik

The Department of Political Science and Public Administration offers basic and advanced courses in all major fields of the discipline: American government and politics (local, state, and national), public law and criminal justice, public administration, comparative politics, international relations and global issues, political theory, and methodology of political science. The department affords opportunities for the study of government and administration to students in other curricula and schools.

Graduate courses in political science are available to advanced undergraduates. See listing of graduate degree programs and consult the *Graduate Catalog*.

The department provides opportunities for internships with political parties and campaigns, lobbyists, non-profits, and all levels of government, including the North Carolina General Assembly Legislative Internship Program. Majors in political science with distinguished academic achievements are annually invited to join Zeta Epsilon Chapter of Pi Sigma Alpha, the national political science honor society.

## WORLD WIDE WEB ACCESS

Visit our department at: http://www2.ncsu.edu/ncsu/chass/ps/

## OPPORTUNITIES

There are a number of careers and professions for which a major in political science, or extensive study of government and politics, can be most useful. This is true especially for those planning to seek careers in teaching, the legal profession,

criminal justice agencies, state and local government, urban planning, the federal bureaucracy, journalism or in any of the organizations that seek to monitor political processes or to influence the content of public policy. Private firms also seek managers and public affairs specialists who have a knowledge of the functioning of the political system and of politics in general.

## POLITICAL SCIENCE HONORS PROGRAM

Nine credit hours of specialized coursework designed to challenge academically talented majors and allow them to realize their greatest potential as political science students. Required for admission to the program: 3.250 GPA both overall and in the major, completion of 9 hours of PS coursework, and completion of either PS 371 or PS 471.

Majors admitted to the program complete a substantial research project in consultation with faculty honors advisor (6 credit hours). Also required: either one 500-level PS course or an honors-option 400-level political science course (3 credit hours). Successful completion of the program is noted on the student's transcript, diploma, and at commencement.

## BACHELOR OF ARTS IN POLITICAL SCIENCE

Major requirements are 30 hours (in addition to any political science course taken to satisfy the 12-hour social science requirement); grades of C- or better for courses applied towards the major with a minimum GPA of 2.000 for all political science courses taken; 21 hours at the 300-level or above, including two 400-level courses, one of which must be a seminar; PS 201; and at least six hours in each of three pairs of subfields (Pair A: American Politics/Policy and Administration, Pair B: International or Comparative Politics, Pair C: Political Theory/Social Science Methods).

The department offers a Criminal Justice Option for students interested in the nature and causes of crime as well as the processes of making and implementing criminal justice policy. The option includes coursework in both sociology and political science. Students fulfill the normal requirements for the College and the major, but choose 28 hours from a prescribed group of public law and criminal justice courses. The option also includes a fieldwork component, which allows students to work in a criminal justice agency in the senior year. The program is suitable for those interested in a management or policy-making position in police, court, correctional, or probation and parole agencies.

**Law and Political Philosophy Concentration**—The Concentration in Law and Political Philosophy is an interdisciplinary program designed for students who are interested in the theoretical and legal dimensions of political life. It seeks to develop a broad understanding of the relationship between law and politics and the moral and philosophical questions which are central to both. The concentration is fulfilled by successful completion of 12 hours of core course requirements, 9 hours of recommended electives, and completion of the normal political science major requirements. Six hours of the core course requirements and at least 3 hours of the recommended electives will be taken in the Department of Philosophy and Religion. Courses in the concentration provide a humanistic perspective on legal and political questions. The program is suitable for those interested in a career in law or government or those who hope to pursue graduate studies in either political science or philosophy.

**Social Studies Teacher Education Option**—A major in political science may also choose a Teacher Education Option. This is a 126-credit-hour degree program which includes the normal 30-hour major plus the required professional education courses. Successful completion of the program leads to certification to teach social studies in the secondary schools. Enrollments may be limited in Teacher Education Option programs.

## BACHELOR OF SCIENCE IN POLITICAL SCIENCE

The major requirements for a B.S. degree in political science are identical to the B.A. except that 27 hours of course work in the discipline are required instead of 30.

## MINOR IN POLITICAL SCIENCE

The Minor in Political Science requires 15 hours of political science courses with grades of C- or better and a minimum GPA of 2.000; nine hours must be at the 300-level or above, including a 400-level seminar; coursework must be drawn from at least two of the following subfields (Pair A: American Politics/Policy and Administration; Pair B: International or Comparative Politics; Pair C: Political Theory/Social Science Methods).

# SOCIAL WORK PROGRAM, DIVISION OF MULTIDISCIPLINARY STUDIES

1911 Building, Room 232

P. N. Reid, *Director*

Cheryl Waites, *Coordinator of Advising and Admissions and Assistant Director*

*Professor*: P.N. Reid; *Associate Professor Emeritus*: I.E. Russell; *Assistant Professors*: M.J. Macgowan, J.P. Murray, C. Waites; *Lecturer*: L.R. Williams; *Adjunct Instructors*: A. Burch, D. Courtney, E. Cummings, P. Denning, M. Deyampert, W. Dubrick, J. Haire, C. Terwilliger.

The Social Work Program is fully accredited by the Council on Social Work Education and offers the Bachelor of Social Work (BSW) degree. Students complete a curriculum based on the liberal arts that incorporates a professional foundation, including social work practice, human behavior and diversity, community social services, social policy, and research methods. Optional courses offer opportunities to study in depth various social work practice areas such as child welfare, health care, multi-cultural practice, black family, and school social work. Students will complete several volunteer experiences and a 480-hour field placement in a social service setting. A Minor in Social Work is available.

The purpose of the Social Work Program is to prepare students for entry-level professional practice in social work or for advanced graduate-level academic work. The curriculum includes 75 hours in English composition, literature, history, natural science, technology and society, mathematics, foreign languages, philosophy, social sciences, physical education and free electives. Thirty-six hours of core social work courses, three hours of social work electives, and ten hours of sociology and statistics complete the 124-hour graduation requirement.

## OPPORTUNITIES

Social work is an exciting, challenging, and dynamic profession. No matter what the political climate or the changing nature of personal or social need, social workers will be in demand. Social workers are employed in a variety of settings which include health care, mental health, services to the aging, child welfare, public welfare, substance abuse, public schools, developmental disabilities, and many other public and private settings.

In each of these areas there is recognition for professional preparation, and the BSW graduate will be prepared to embark upon a career in his or her chosen field. North Carolina and 48 other states have licensing or certification procedures for social work practice. Graduation from the Social Work Program makes the student eligible for such licensing or certification, as well as advance standing in many graduate programs.

## MINOR IN SOCIAL WORK

The minor is designed to familiarize students with the social service system, major social welfare programs, and elements of the profession of social work. The student will take five required courses and select one additional course from elective offerings which examine the contribution of professional social work in a number of settings.

## STUDENT ACTIVITIES

There are two student groups for social work majors. The Student Social Work Association (SSWA) is open to all social work majors. SSWA meets regularly and provides an opportunity for students to socialize and become involved in the professional community outside the school.

The organization is involved in a wide variety of campus and community activities such as fundraising, lobbying, volunteering, and service projects. SSWA provides funds for students to attend professional conferences and meetings. SSWA is a program unit of the National Association of Social Workers, North Carolina chapter, and students have served as elected representatives to the board of directors of the chapter. The SSWA is active and aids in maintaining a sense of unity and purpose among the students.

In the Fall of 1992, a group of African-American students formally organized and was recognized by NC State as a student branch or chapter of the Association of Black Social Workers. Members of this organization meet on a monthly basis at the African American Cultural Center on the NC State campus.

The goals of this organization are to provide students access to publications produced by members of the national organization and to distribute information from the national and regional conferences to the student chapter (such as policy decisions and revisions; positions on topical issues; themes processed in regional and national conferences; and access to speakers, locally and nationally, who can assist with practical and theoretical information that will inform student decisions and choices for career development).

## ADMISSION TO THE PROFESSIONAL DEGREE PROGRAM

The social work faculty is committed to helping all entering students evaluate career goals and objectives to ensure that the students meet minimum academic standards; have goals and objectives compatible with the major; and know specifically what the profession of social work is in terms of its philosophy, value base, and fields of practice. The admissions procedure is intended to strengthen the student's certainty regarding career choice and to enhance the student's focus and sense of purpose in curriculum planning. Specific components of the admissions procedure include: completion, with a grade of C or better, of any 200-level social work course; participation in an orientation session; completion of the application for admission; a personal interview with a faculty advisory committee. The Social Work Program Student Handbook spells out further details of this procedure, as well as other elements of the Social Work Program.

## CURRICULUM IN SOCIAL WORK
### Degree earned: Bachelor of Social Work

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 111 Comp. & Rhetoric | 3 |
| FL_ 201 Intermediate Foreign Language I[1] | 3 |
| Math.[3] | 3 |
| SOC 2__ Elective[3] | 3 |
| SW 201 Community Social Services[4] | 3 |
| Any 100-level PE in Fitness & Wellness[2] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 112 Comp. & Rhetoric | 3 |
| SW 290 Development of Social Welfare in the U.S.[4] | 3 |
| History[6] | 3 |
| Math.[3] | 3 |
| Philosophy[7] | 3 |
| Physical Education Elective[2] | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ANT 252 Cultural Anthropology | 3 |
| History[6] | 3 |
| Literature[8] | 3 |
| Natural Science[9] | 4 |
| Physical Education Elective[2] | 1 |
| Free Elective | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| SW 310 Human Behav. Theory for Soc. Work Pract.[4] | 3 |
| Literature[8] | 3 |
| Natural Science[9] | 4 |
| Social Science (PS/EC 2__)[3] | 3 |
| PSY 200 | 3 |
| Physical Education Elective[2] | 1 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| SOC 305 Racial and Ethnic Relations | 3 |
| ST 311 Intro. to Statistics | 3 |
| SW Elective[4] | 3 |
| Natural Science[9] | 3 |
| Sci., Technology & Soc.[10] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| HSS 100 CHASS Computer Literacy[11] | 0 |
| SOC 300 Social Research Methods | 4 |
| SW 307 Economic Security Programs[4] | 3 |
| SW 320 Social Work Practice I[4] | 3 |
| Free Electives | 6 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| SW 405 Social Work Practice II[4] | 3 |
| SW 420 Legal Aspects of Social Work[4] | 3 |
| Social Science (ANT/SOC 300/400 level)[3] | 3 |
| Free Electives | 6 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| SW 490 Fieldwork in Social Service[4] | 12 |
| | 12 |

Minimum Hours Required for Graduation ..... 124

[1]Demonstrated proficiency at the first-semester intermediate level (FL_ 201) in a foreign language. In order to enroll at the 201 level, prerequisites must be met through course work or the Placement Test.

[2]Any 100 level PE Fitness & Wellness course and three additional credit hours of PE activity courses for four hours graduation credit are required.

[3]The twelve-hour social science requirement of the College of Humanities and Social Sciences is met with any 200-level sociology course, a 300-or 400-level sociology or anthropology course, PSY 200, and a basic course in political science (PS 201 or 202) or economics (EC 201 or 202).

[4]The Bachelor of Social Work consists of 39 hours in the major including the twelve hours of fieldwork (SW 490). Practice and Field Work courses must be taken in successive semesters. SW 490 is scheduled in both fall and spring semesters but must be taken **during the student's last semester.**

[5]Two mathematics courses (6 hours credit) are required.

[6]This two-semester requirement includes a course concerned with pre-industrial Western or non-Western societies (HI 207, 208, 209, 215, 216, 263, 264, 275, or 276), and another dealing with the United States or post-industrial Western societies (HI 205, 210, 221, 222, 233, 251, or 252).

[7]Three hours of philosophy, exclusive of logic (LOG 201 and 335), are required.

[8]This requirement consists of two literature courses, at least one of which must be in literature outside the United States and prior to the twentieth century. One of the courses must come from the following: ENG/FL 221, ENG/FL 222; ENG 251*, ENG 261*, ENG 262*; FLF 301; FLS 301; FLG 316; or FLR 303. The second course may also come from the list above or it may be a course in American or twentieth century literature (either ENG/FL 223, ENG/FL 224; ENG 246, ENG 248, ENG 252, ENG 265, ENG 266; or FLR 304), or it may be an upper-division survey course or literature course in a period, genre or major figure in English, a foreign language in English translation, or the original foreign language (either ENG 305, 349, 351, 362, 363, 369, 371, 372, 376, 377, 380, 382, 383, 385, 390, 398, 399, 439, 448, 449, 451, 453, 462, 463, 468, 469, 486, 487; ENG/FL 394; FLF 302, 316, 323, 324, 352, 414, 415, 492; FLG 323; FLS 302, 304, 323, 403, 404, 492; or GRK 320). *Students using ENG 261 or ENG 262 to satisfy this requirement may **not** also use ENG 251.

[9]The natural science requirement calls for a minimum of eleven credit hours; at least two courses must include a laboratory experience. Students must receive credit for two different basic introductory courses from the university approved lists in physics, chemistry, the earth sciences, and the biological sciences. The third course is selected from the following: GN 301, NTR 301, FS 301 and BIO 125 or BIO 105 (if not used to fulfill basic introductory science requirement). Note: if BIO 125 or 105 has been taken, the other may not be taken for credit; BO 200 may not be combined with either BIO 125 or BIO 105; and CH 100 may not be taken for credit if the student has previously received credit for CH 101.

[10]One three-credit course taken from the university approved lists of courses in Science, Technology and Society (Humanities and Social Sciences Perspectives list or Science and Technology Perspectives list). The course used to meet this requirement may not be used to fulfill any other requirement.

[11]Certification of computer literacy through the successful completion of HSS 100 is a graduation requirement for all majors in the College of Humanities and Social Sciences.

# DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY

(See College of Agriculture and Life Sciences)
1911 Building, Room 301

W.B. Clifford, *Head*

M.T. Zingraff, *Associate Head*

R.S. Ellovich, *Undergraduate Administrator*

A.C. Davis, *Undergraduate Coordinator (Applied Sociology)*

M.D. Schulman, *Director of Graduate Programs*

S.K. Garber, *Department Extension Leader*

**SOCIOLOGY TEACHING, RESEARCH AND EXTENSION FACULTY**

*Professors*: W.B. Clifford, L.R. Della Fave, V.A. Hiday, R.L. Moxley, L.B. Otto, M.M. Sawhney, M.D. Schulman, D.T. Tomaskovic-Devey, R.C. Wimberley, E.M. Woodrum, M.T. Zingraff; *Professors Emeriti:* J.N. Collins, E.M. Crawford, T.N. Hobgood Jr., C.P. Marsh, O. Uzzell, M.E. Voland, J.N. Young; *Associate Professors:* M.P. Atkinson, R.F. Czaja, A.C. Davis, S.K. Garber, G.D. Hill, T.J. Hoban, J.C. Leiter, S.C. Lilley, B.J. Risman, M.L. Schwalbe, M.S. Thompson, R.J. Thomson, K.M. Troost; *Associate Professors Emeriti:* R.C. Brisson, P.P. Thompson; *Assistant Professors:* T.N. Greenstein, P.L. McCall, W.R. Smith, C.R. Zimmer; *Assistant Professors Emeriti:* C.G. Dawson, T.M. Hyman; *Associate Member of the Faculty:* R.D. Mustian (Agricultural and Extension Education).

**ANTHROPOLOGY TEACHING AND RESEARCH FACULTY**

*Associate Professors*: I. Rovner, M.L. Walek, J.M. Wallace; *Associate Professors Emeriti:* G.S. Nickerson, J.G. Peck; *Assistant Professors:* R.S. Ellovich, A.L. Schiller.

The Department of Sociology and Anthropology offers introductory and advanced courses in sociology and anthropology covering the major sub-fields of the two disciplines. It also offers supervised field work and practicum experiences required for certain curricula in the department.

Aims of the departmental offerings are to provide majors with academic background and experience useful for many careers in government and industry or for pursuing advanced academic work (for a description of the graduate degrees offered by the department, see the *Graduate Catalog*) and to provide service courses to other students.

The department, jointly administered by the Colleges of Humanities and Social Sciences and Agriculture and Life Sciences, offers six undergraduate curricula. The four curricula administered by the College of Humanities and Social Sciences are Bachelor of Arts in Sociology, Bachelor of Arts in Sociology with Criminal Justice

Option, Bachelor of Arts in Sociology with Social Studies Teacher Education Option, and Bachelor of Arts in Sociology with Anthropology Concentration.

## SOCIOLOGY AND ANTHROPOLOGY HONORS PROGRAM

In this program, outstanding majors pursue an individual program of study involving close working relations with departmental faculty. Twelve credit hours of honors courses will allow students to enhance their expertise in sociology and anthropology. Honors courses combine nine hours of credit in regular and independent study classes with a three-credit honors thesis done in consultation with a faculty honors advisor.

To be admitted, students must have earned 12 hours in their major and have a 3.000 overall GPA and a 3.250 in the major. To graduate with Sociology/Anthropology Honors, the student must have a 3.250 GPA overall and in the major. Successful completion of the program is noted on the student's transcript diploma and at commencement.

## BACHELOR OF ARTS IN SOCIOLOGY

The following departmental requirements must be met by all students majoring in sociology: A minimum of 31 hours in the major field including SOC 300, Social Research Methods; SOC 400, Theories of Social Structure; SOC 401, Theories of Social Interaction; at least three but no more than six credit hours of 200-level sociology courses; at least 15 credit hours of 400-level or above sociology courses including SOC 400 and SOC 401. (Note: In the LCS program [anthropology concentration], 3 credit hours at the 400-level or above are in anthropology.) Additional electives in sociology may be at the 300-level or above. ANT 252, Cultural Anthropology, is required. A second course in anthropology is strongly recommended. ST 311, Introduction to Statistics, is also required.

**Criminal Justice Option** - The Criminal Justice Option seeks to develop a professional orientation that will be relevant both to occupational goals and participation as a citizen in community affairs. Courses in both political science and sociology are included in a 25-hour block that provides a general background in crime causation and agencies of criminal justice plus the opportunity to select from more specific courses dealing with deviance, juvenile delinquency, the court system, correctional facilities, and the like, including field placement in an agency of the criminal justice system.

**Social Studies Teacher Education Option** - This curriculum prepares the student for state certification in social studies in the secondary school system. (127 hours required for graduation). The inclusion of a professional semester with practice teaching and the need for a broad base in the social sciences makes this a comparatively demanding program. Courses in education and psychology are taken beginning in the sophomore year in preparation for the teaching experience. The student learns the basic concepts of economics, political science, anthropology and history, as well as sociology. Enrollments in Teacher Education Option programs may be limited.

**Anthropology Concentration** - This concentration emphasizes the complementary nature of sociology and anthropology in understanding human behavior in social and cultural context. It encourages flexibility in selection from both anthropology (12 hours within the major plus 6 hours in the social science requirement) and sociology (22 hours) courses. The four anthropological subdisciplines of cultural anthropology, physical anthropology, archaeology, and linguistics are represented in the course offerings.

## MINOR IN ANTHROPOLOGY

A Minor in Anthropology focuses on the comparative study of human beings, with emphasis on both the physical and cultural aspects. A flexible selection of courses (15 credit hours) includes offerings from anthropological subdisciplines such as cultural anthropology, physical anthropology, archaeology, and linguistics.

## MINOR IN SOCIOLOGY

This minor emphasizes sociological theory and research with substantive applications. The minor builds on theory and methodology and allows students flexibility in the choice of subdisciplines such as criminology, stratification, demography, social psychology, race and ethnic relations, or the family.

# INTERDISCIPLINARY PROGRAMS

Two formal interdisciplinary programs provide students with baccalaureate study opportunities in fields which are complex and interdisciplinary in nature. The B.S. in Environmental Sciences and B.S. in Natural Resources represent the collaboration of faculty in the colleges of Agriculture and Life Sciences, Forest Resources, and Physical and Mathematical Sciences. Each degree program offers various curricular concentrations, and each concentration is administered by an academic department. Some of the concentrations are designed to prepare students for specific professional career tracks, e.g., Environmental Sciences, Watershed Hydrology, while others are intended primarily to prepare students for graduate study in a specific field, e.g., Environmental Sciences, Ecology. All of the concentrations place a strong emphasis on communications and computer skills.

## ENVIRONMENTAL SCIENCES

Jordan Hall, Room 3110

James D. Gregory, *Department of Forestry, Environmental Sciences Program Coordinator and Concentration Coordinator: Environmental Sciences, Watershed Hydrology (ESH)*

Victor V. Cavaroc; *Department of Marine, Earth, and Atmospheric Sciences; Concentration Coordinator: Environmental Sciences, Geology (ESG)*

H. Joseph Kleiss, *Department of Soil Science, Concentration Coordinator: Environmental Sciences, Soil Science (ESS)*

Samuel C. Mozley, *Department of Zoology, Concentration Coordinator: Environmental Sciences, Ecology (ESC)*

Arnold W. Oltmans; *Department of Agricultural and Resource Economics, Concentration Coordinator: Environmental Sciences, Economic (ESE)*

Allen J. Riordan; *Department of Marine, Earth, and Atmospheric Sciences; Concentration Coordinator: Environmental Sciences, Air Quality (ESA)*

Bill J. Stines, *Department of Statistics, Concentration Coordinator: Environmental Sciences, Statistics (EST)*

The professional field of environmental sciences covers a broad area of concern in the uses of the environment in today's society, ranging from applications of the basic chemical, physical, and biological sciences to the economic, policy, and ethics issues related to the wise use of the environment for the needs of society. The field is complex and interdisciplinary in nature and, therefore, it is difficult to provide thorough coverage of all areas of environmental sciences in one undergraduate curriculum. North Carolina State University has developed an innovative, campus wide degree program, designed to introduce students to the broad subject while still providing an in-depth education in one aspect of the field.

The Environmental Sciences program prepares students for entry-level positions that involve applications of environmental sciences in a variety of industrial and technology organizations and environmental consulting firms in the private sector and a variety of local, state, and federal agencies in the public sector. The environmental sciences program also provides excellent preparation for graduate school, medical or law school.

The Bachelor of Science in Environmental Sciences, established in 1993, is designed to recognize not only the broad interdisciplinary nature of environmental science issues, but to also recognize the need to have a solid education in the natural sciences, mathematics, and humanities and social sciences. The degree program consists of an 89-hour core coupled with specific concentration areas which prepare graduates for entry-level positions as well as serve as a solid basis for further graduate education. Common to all concentrations are a freshman introductory course and a senior capstone course. The senior course, taught as a series of case studies, will prepare students to bring their special expertise together in teams to address current environmental issues.

The specific Environmental Sciences concentrations and the departments that administer them are listed below. Students who are interested in one or more of the concentrations should refer to the section of the catalog where the departmental programs are described for more information and are also encouraged to contact the appropriate concentration coordinators. Students interested in these curricula should recognize that the mathematics and physical science requirements of the

Environmental Sciences core are similar to those in the engineering curricula. Applicants must have a strong background in mathematics, physics, and chemistry in addition to biological science.

## CONCENTRATIONS

**Environmental Sciences, Air Quality (ESA)**
**Environmental Sciences, Environmental Geology (ESG)**

College of Physical and Mathematical Sciences; Department of Marine, Earth, and Atmospheric Sciences. Concentration Coordinator for **Air Quality**: Allen J. Riordan, Jordan Hall (Room 5147), phone (919) 515-7973, E-mail: Al_Riordan@ncsu.edu. Concentration Coordinator for **Environmental Geology**: Victor V. Cavaroc, Jordan Hall (Room 2123), phone (919) 515-7836, E-mail: Vic_Cavaroc@ncsu.edu.

**Environmental Sciences, Ecology (ESC)**

College of Agriculture and Life Sciences, Department of Zoology. Concentration Coordinator: Samuel C. Mozley, Gardner Hall (Room 2104), phone (919) 515-1981, E-mail: S_Mozley@ncsu.edu.

**Environmental Sciences, Economic Policy (ESE)**

College of Agriculture and Life Sciences, Department of Agricultural and Resource Economics. Concentration Coordinator: Arnold W. Oltmans, Nelson Hall (Room 233E), phone (919) 515-4546, E-mail: Arnie_Oltmans@ncsu.edu.

**Environmental Sciences, Environmental Soil Science (ESS)**

College of Agriculture and Life Sciences, Department of Soil Science. Concentration Coordinator: H. Joseph Kleiss, Williams Hall (Room 2321), phone (919) 515-2643, E-mail: Joseph_Kleiss@ncsu.edu.

**Environmental Sciences, Statistics (EST)**

College of Physical and Mathematical Sciences, Department of Statistics. Concentration Coordinator: Bill J. Stines, Cox Hall (Room 612D), phone (919) 515-194, E-mail: Stines@stat.ncsu.edu..

**Environmental Sciences, Watershed Hydrology (ESH)**
College of Forest Resources, Department of Forestry. Concentration Coordinator: James D. Gregory, Jordan Hall (Room 3110), phone (919) 515-7567, E-mail: Jim_Gregory@ncsu.edu.

## NATURAL RESOURCES

Jordan Hall, Room 3110

James D. Gregory, *Department of Forestry, Natural Resources Program Coordinator*

Awatif E. Hassan, *Department of Forestry, Concentration Coordinator: Natural Resources, Ecosystem Assessment (NRE) and Natural Resources, Policy and Administration (NRP)*

Arnold W. Oltmans, *Department of Agricultural and Resource Economics, Concentration Coordinator: Natural Resources, Economics and Management (NRM)*

Edward F. Stoddard, *Department of Marine, Earth, and Atmospheric Sciences, Concentration Coordinator: Natural Resources, Geological Resources (NRG)*

Stephen W. Snyder, *Department of Marine, Earth, and Atmospheric Sciences, Concentration Coordinator: Natural Resources, Marine and Coastal Resources (NRC)*

H. Joseph Kleiss, *Department of Soil Science, Concentration Coordinator: Natural Resources, Soil Resources (NRS) and Natural Resources, Soil and Water Systems (NRW)*

The baccalaureate degree program in Natural Resources, established in 1992, is designed to produce natural resources professionals with a broad interdisciplinary background coupled with a specific focus in natural resources assessment and management. The concentrations are broadly concerned with identifying, understanding, protecting, enhancing, and managing the environment. Students learn how natural ecosystems function and how to maintain the functions that are important

both for ecosystem sustainability and for man's use of those ecosystems. Students learn about the economic, social, and political issues of environmental management and how to consider those issues in the management decision-making process.

The program prepares students for entry-level positions in environmental assessment, management, and protection in local, state, or federal government agencies or in private industry and consulting firms, and it also provides an excellent base for graduate school.

Natural resource management is a broad and complex field with a wide variety of professional specialties. The degree program in Natural Resources addresses that complexity with a campus-wide program involving three colleges and four departments in the administration of seven concentrations. The Natural Resources curricula are rigorous math and science-based programs with a common core of math, science, communications, and humanities and social science courses that provide a broad general education. Each concentration then combines a set of advanced courses with the core to provide a curriculum with a specific focus in natural resource management.

To promote the interaction and teamwork so important in natural resource management, students enrolled in all the concentrations will take two common courses. The degree program begins with NR 100 Introduction to Natural Resources to set the stage and culminates with the capstone course, NR 400 Natural Resource Management, in which the students work together in interdisciplinary teams to put into practice the problem-solving and decision-making skills that are central to the work of a natural resources professional.

The specific Natural Resources concentrations and the departments that administer them are listed below. Students who are interested in one or more of the concentrations should refer to the section of the catalog where the departmental programs are described for more information and are also encouraged to contact the appropriate concentration coordinators.

## CONCENTRATIONS

**Natural Resources, Economics and Management (NRM)**

College of Agriculture and Life Sciences, Department of Agricultural and Resource Economics. Concentration Coordinator: Arnold W. Oltmans, Nelson Hall (Room 233E), phone (919) 515-4546, E-mail: Arnie_Oltmans@ncsu.edu.

**Natural Resources, Ecosystem Assessment (NRE)**

**Natural Resources, Policy and Administration (NRP)**

College of Forest Resources, Department of Forestry. Concentration Coordinator: Awatif E. Hassan, Biltmore Hall (Room 3024B), phone (919) 515-7577, E-mail: awatif_hassan@.ncsu.edu.

**Natural Resources, Geological Resoources (NRG)**

**Natural Resources, Marine and Coastal Resources (NRC)**

College of Physical and Mathematical Sciences; Department of Marine, Earth, and Atmospheric Sciences.

Concentration Coordinator for Geological Resources, Edward F. Stoddard, Jordan Hall (Room 2140), phone (919) 515-7939, E-mail: Skip_Stoddard@unity.ncsu.edu. Concentration Coordinator for Marine and Coastal Resources: Stephen W. Snyder, Jordan Hall (Room 3133), phone (919) 515-7912, E-mail: SWSnyder@unity.ncsu.edu.

**Natural Resources, Soil Resources; (NRS)**

**Natural Resources, Soil and Water Systems (NRW)**

College of Agriculture and Life Sciences, Department of Soil Science. Concentration Coordinator: H. Joseph Kleiss, Williams Hall (Room 2321), phone (919) 515-2643, E-mail: Joseph_Kleiss@ncsu.edu.

# COLLEGE OF MANAGEMENT

*Nelson Hall*
*NCSU Box 8614*
*Raleigh, NC 27695-8614*

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R.J. Lewis, *Dean*

J.W. Bartley, *Associate Dean for Academic Affairs*

J.E. Brooks, *Coordinator of Career Services*

E.O. Dixon, *Director of Admissions*

G.A. Hankins, *Director of Academic Affairs and African-American Coordinator*

A.L. Irby, *Director of Advising*

A.F. Nowel, *Director of Student Services*

The College of Management offers a variety of curricula that prepare graduates to become leaders in a global business environment. Students may prepare for careers in fields such as accounting, financial management, manufacturing management, marketing, sales, economic analysis, human resource management, quality management, management information systems, and general management. Opportunities for employment include corporations, consulting and public accounting firms, government agencies, and non-profit organizations. Many graduates pursue advanced studies in law, professional accounting, economics, and business administration.

The curricula provide all students with a broad liberal arts background combined with a strong concentration in accounting, business, or economics. Communication skills and computer usage are stressed throughout the course work. The College faculty are dedicated to excellence in teaching and research. An outstanding faculty combined with innovative curricula provide students with the opportunity to acquire the basic knowledge and management skills necessary to become leaders in the business world. Many courses are offered in the evening, as well as the day and provide part-time educational opportunities to employed adults.

The three departments in the college, Accounting, Business Management, and Economics, graduate more than 500 students annually. Four undergraduate degree programs are offered: B.S. in Accounting, B.S. in Business Management, and B.A. and B.S. in Economics. The accounting and business management degrees are professionally oriented while the economics degrees are both liberal arts degrees. New freshmen and transfer students with fewer than 40 hours of college credit may enter an Undeclared Major in the College. After completing 40 credit hours, students in the Undeclared Major enter a degree program. Graduate degrees offered include: Master of Accounting, Master of Economics, Master of Science in Management, and Ph.D. in Economics.

****University Physical Education requirements have been modified. It is recommended that students consult with their adviser on specific curriculum requirements regarding PE.*

Students may pursue a dual degree program in which they receive both a B.S. in Electrical Engineering and M.S. in Management. For further information contact the Coordinator of Advising, Department of Electrical and Computer Engineering, Box 7911, 515-2336.

## FACILITIES

The departments of Accounting and Business Management are located in Nelson Hall. The department of Economics is located in Patterson Hall with faculty offices in the 1911 Building and the Hillsborough Building. A large computing lab in Nelson Hall provides students access to multimedia personal computers served by a local area network and linked to the Internet. All of the College's primary classrooms are equipped for multimedia presentations.

## STUDENT SERVICES

The College of Management provides comprehensive academic advising services to undergraduate students. New freshmen and off-campus transfer students are assigned to specialized advisors. All students have access to a faculty advisor and to the College's professional advising staff located in the Academic Affairs Office, 114 Nelson Hall.

The College of Management has an office of career services devoted to assisting accounting, business management, and economics majors with career related issues. University career services include individual career counseling as well as workshops

on resume writing, interviewing techniques, and on-campus recruiting. A wide range of companies and government agencies recruit students. The Career Center also assists students in locating part-time jobs and internships.

The Director of Admissions for the College provides personalized guidance for individuals seeking admission to the College's undergraduate degree programs.

## SCHOLARSHIPS

In addition to university-wide awards, the College has the following scholarships: the College of Management Dean's Scholarship, Accounting Freshman Award for entering freshmen, Accounting Firms' Merit Awards available to juniors majoring in accounting, the First Union Undergraduate Scholarship Award, the Lichtin Family Scholarship, the Robert L. Shaw Memorial Scholarship in accounting, and R. Ray Moore Scholarship available to rising juniors and seniors majoring in business management and economics. The College contacts all applicants for admission who may be eligible for scholarships.

## MINORS

Academic minors for students in other majors are offered in accounting, business management, and economics.

## STUDENT ACTIVITIES

There are two honor societies: Sigma Beta Delta for accounting and business management majors and Omicron Delta Epsilon for economics majors. Students also have the opportunity to join many management related organizations including the Accounting Society, Alpha Kappa Psi (professional business fraternity), American Advertising Federation, College of Management Advisory Board, Economics Society, Entrepreneur's Club, National Association of Black Accountants, Pre-Law Student Association, Society for African-American Corporate Leaders, and the Society for Human Resource Management. These organizations sponsor social events and hold regular meetings where business leaders discuss current issues and provide career advice.

# DEPARTMENT OF ACCOUNTING

Nelson Hall, Room 201E

C.J. Messere, *Head*

R.L. Peace, *Director of Graduate Programs*

*Alumni Distinguished Undergraduate Professors*: R.L. Peace, C.J. Skender; *KPMG Peat Marwick Professor:* C.J. Messere; *Professors*: J.W. Bartley, K.B. Frazier, P.F. Williams; *Professors Emeriti:* L.B. Thorne, P.R. Windham; *Associate Professors:* F.A. Buckless, A.Y. Chen, R.L. Peace, R.B. Sawyers, G.J. Zuckerman; *Assistant Professors:* M.S. Beasley, B.C. Branson, K.A. Krawczyk, R.L. McClenny, D.P. Pagach; *Lecturers*: E.R. Carraway, J.W. Giles, H.O. Griffin, W.A. Koole, G.A. Marsh, C.J. Skender.

The accounting program provides education and training to individuals who will pursue careers as professional accountants in business, government, or industry. The Department of Accounting currently offers a Bachelor of Science degree in accounting. In order to meet the demands of employment markets for more highly skilled accounting professionals and respond to the American Institute of Certified Public Accountants' mandated 150-hour education requirement by the year 2000, the Department of Accounting also offers a fifth- year Masters of Accounting (MAC) degree program.

## OPPORTUNITIES

Accounting systems and the accountants who maintain them are absolutely essential to the functioning of business enterprises of all types and sizes, to government at all levels; and to nonprofit organizations. Many career opportunities are available to accounting graduates. Starting salaries are among the highest of all university graduates, and potential earnings over a lifetime are excellent.

The accounting profession is organized into three major employment groups:

- approximately 60 percent of accountants are employed in business entities;
- another 10 percent work in nonbusiness entities;
- about 30 percent are in public practice.

Public accountants offer auditing tax preparation and planning and management consulting to individuals, businesses, and other organizations on a fee basis. Management or industrial accountants design financial and cost accounting systems and provide their companies with financial management, financial analysis, planning and budgeting, product costing, and operational auditing. Governmental units and other not-for-profit entities have informational needs similar to private businesses. Accountants employed by such entities perform many of the same functions.

Accountants in some governmental agencies, such as the SEC, IRS, and FBI, serve the dual function of auditing and law enforcement.

Certified public accountants (CPAs), certified management accountants (CMAs), certified internal auditors (CIAs) and certified cost analysts (CCAs) are individuals who, like doctors, dentists, and lawyers, are licensed to practice their profession. Such certifications are granted to those accountants who pass a qualifying examination and meet certain accounting experience and educational requirements.

## SCHOLARSHIPS AND AWARDS

Approximately ten achievement awards sponsored by businesses and public accounting firms are made to outstanding students annually. A special accounting faculty fund supports similar awards for outstanding incoming freshmen each year.

## CURRICULUM AND DEGREE REQUIREMENTS

All Accounting majors graduating after Summer II 1997 are subject to a departmental residency requirement that they complete a minimum of 30 credit hours of course work at NC State after being formally admitted to the B.S. degree program in Accounting (or the B.S. in Business Management). In addition, Accounting majors must complete at least 30 credit hours of major courses and at least six of the following seven courses in residency at NC State: ACC 310, 311, 320, 330, 410, 450, and 490. A "General Policies" statement for all College of Management majors is available in Nelson Hall 114. It serves as an addendum to the curriculum requirements and describes GPA requirements for graduation, residency requirements, suspension policy, required grades in specific courses, course repeat policy.

## CURRICULUM IN ACCOUNTING
### Degree earned: B.S. in Accounting

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ACC 100 Intro. Accounting Profession. | 1 |
| ENG 111 Comp. & Rhetoric[1] | 3 |
| MA 121 Elements of Calculus[2] | 4 |
| History Elective[3] | 3 |
| Natural Science Elective[4] | 4 |
| Any 100-level PE in Fitness & Wellness [12] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| COM 110 Public Speaking or | |
| COM 146 Business Comm. | 3 |
| ENG 112 Comp. & Reading[1] | 3 |
| M 200 Micro Applic. Bus. Accounting. | 1 |
| Humanities/Soc.Sci. Elective[3] | 3 |
| Natural Science Elective[4] | 4 |
| Physical Education Elective | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ACC 210 Accounting I | 3 | ACC 220 Accounting II | 3 |
| BUS 201(295B) Intro. Bus. Procedures | 3 | BUS 335 Organizational Behavior | 3 |
| EC 201 Intro. to Economics | 3 | BUS/ST 350 Economics./Bus. Stat[5] | 3 |
| MA 114 Intro. to Finite Math[2] | 3 | EC 202 Economics Prob. & Issues | 3 |
| PSY 200 Intro. to Psychology | 3 | Ethics Elective[6] | 3 |
| Physical Education Elective | 1 | Physical Education Elective | 1 |
| | 16 | | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ACC 310 Intermed. Fin. Accounting[1] | 3 | ACC 300 The Accounting Profession[9] | 1 |
| ACC 320 Managerial Uses of Cost[7] | 3 | ACC 311 Intermed. Fin. Accounting II[7] | 3 |
| BUS 370 Operations Mgmt. | 3 | ACC 330 Intro. to Income Tax[7] | 3 |
| ENG 33x[8] Advanced Writing Elective | 3 | BUS/CSC 340 Info. Systems Mgmt | 3 |
| Restricted Elective[9] | 3 | Sci., Technology, and Soc. Elective[4] | 3 |
| | 15 | Restricted Elective[10] | 3 |
| | | | 15-16 |

SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ACC 410 Govt. & Spec. Rpt. Issues | 3 | ACC 300 The Accounting Profession[9] | 1 |
| ACC 440 Accounting. Info. Systems[7] | 3 | ACC 307 Business Law | 3 |
| BUS 320 Financial Mgmt. | 3 | ACC 450 Auditing Fin. Info.[7] | 3 |
| BUS 360 Marketing Methods | 3 | ACC 490 Senior Seminar | 3 |
| Literature Elective[3] | 3 | College of Mgmt. Elective[11] | 3 |
| | 15 | Restricted Elective[10] | 3 |
| | | | 15-16 |

Minimum Hours Required For Graduation . . . . . 124

[1]"C's" or better in both ENG 111 and 112 (or ENG 112-H) are required.
[2]MA 131 or 141 may substitute for MA 121. MA 242 may substitute for MA 114.
[3]One course from among the History, Literature, and H & SS electives must focus on a non-English speaking culture.
[4]Three courses (11 hours) from natural sciences; 8 hours of Basic Natural Science and 3 hours from the Science, Technology, and Society (STS) elective list.
[5]ST 361, or 372 may substitute for BUS 350.
[6]One of the following courses in ethics: PHI 275, 311, 313, 314, 321, or 322. (PHI 311, 313, and 322 have a prerequisite.)
[7]COURSES REQUIRING C PREREQUISITES:

| Course | Prerequisites |
|---|---|
| ACC 310 | C- or better in M 200 and ACC 210, |
| ACC 311 | C- or better in ACC 310, |
| ACC 320 | C- or better in M 200 and ACC 220 |
| ACC 330 | C- or better in ACC 210, |
| ACC 440 | C- or better in ACC 310, ACC 320, and BUS/CSC 340, |
| ACC 450 | C- or better in ACC 311, ACC 440 |

[8]ADVANCED WRITING ELECTIVE - Select one of the following: ENG 331 Communication for Engineering and Technology, ENG 332 Communication for Business Mgmt., or ENG 333 Communication for Science and Research
[9]Prospective MAC candidates should enroll in ACC 300 during the spring semester of their Senior year. Those students not planning to enroll in the MAC program should take ACC 300 during the spring semester of their Junior year.
[10]Nine hours of restricted electives are required. These electives *may not* be ACC or BUS courses. One of the three courses may be EC. Credit will not be allowed for FL 101, 102, or 105 (in language in which proficiency requirement is met), and MA 101, 103, 105, 107, 108 and 111.
[11]This course must be in a 400-level BUS or ACC course or a graduate-level ACC course taken for undergraduate credit.

### MINOR IN ACCOUNTING

The Department of Accounting offers a minor in accounting to any undergraduate degree student outside the College of Management. The accounting minor is offered to students interested in gaining a basic knowledge of accounting and an understanding of how accounting information is used to make rational decisions by individuals, businesses, and society.

The minor requires 15 hours of accounting courses and includes an introduction to financial, managerial, and tax accounting principles and practices. The minor is not intended to prepare students for a professional accounting career. Please contact the Academic Affairs office in Nelson 114 for specific information about admission and other requirements.

## DEPARTMENT OF BUSINESS MANAGEMENT

Nelson Hall, Room B32

J.W. Wilson, *Department Head*

S.G. Allen, *Director of Graduate Programs*

*Alumni Distinguished Undergraduate Professors*: J.P. Huggard, J.W. Wilson; *Professors*: S.G. Allen, R.L. Clark, G.W. Dickson, C.P. Jones, D.K. Pearce, J.W. Wilson; *Professors Emeriti*: A.J. Bartley, D.R. Dixon; *Associate Professors*: A. Agrawal, S. Barr, D.L. Baumer, S.N. Chapman, J.C. Dutton, E.A. McDermed, K. Mitchell, A. Padilla, J.C. Poindexter Jr.; *Assistant Professors*: L. Aiman-Smith, C.C. Bozarth, K.S. Davis, S.K. Markham, M. Montoya-Weiss, P. Mulvey, K.D. Schenk, G. Voss, G. Young; *Lecturers*: J.P. Huggard, J.P. Jeck, C.B. Kimbrough. *Associate Members of the Faculty*: A. Kingon, M.E. Kurz, M. Zapata.

The Department of Business Management offers a Bachelor of Science degree in business management that prepares students for careers in business, government or nonprofit organizations and for graduate study in business, law, and related fields. The curriculum offers a broad professional education in a variety of business fields such as finance, human resources, marketing, management information systems, and operations/production management. Career opportunities are available in areas such as retailing, banking and financial services, high- tech manufacturing, transportation, consulting, and government agencies.

The Bachelor of Science degree in business management consists of a broad foundation of humanities, social science, science and mathematics; a comprehensive business core; and a concentration in a functional business area. The program emphasizes management in a highly competitive global economy. Students develop strong communication skills and learn to work in teams. Many courses prepare

students to use information technology and computers. Required courses in the major include accounting, economics, communications, business writing, legal environment of business, computer science, finance, marketing, organizational behavior, quantitative methods, operations management, and business strategy. Business management students also complete a three-course business concentration.

## CURRICULUM DEGREE REQUIREMENTS

All Business Management majors graduating after Summer II 1997 are subject to a departmental residency requirement that they complete a minimum of 30 credit hours of course work at NC State after being formally admitted to the B.S. degree program in Business Management (or the B.S. in Accounting). In addition, Business Management majors must complete at least 30 credit hours of the major course requirements of the degree while in residency at NC State.

A "General Policies" statement for all College of Management majors is available in Nelson Hall 114. It serves as an addendum to the curriculum requirements and describes GPA requirements for graduation, residency requirements, suspension policy, required grades in specific courses, course repeat policy, etc. A sample schedule for a Bachelor of Science in business management is given below.

## CURRICULUM IN BUSINESS MANAGEMENT
## Degree earned: B.S. in Business Management

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BUS 100 Intro. to COM | 1 |
| ENG 111 Comp. & Rhetoric[1] | 3 |
| MA 121 Elements of Calculus[1,4] | 4 |
| History Elective[2] | 3 |
| Natural Science[5] | 4 |
| Any 100-level PE in Fitness & Wellness [12] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 112 Comp. & Reading[1] | 3 |
| M 200 Micro. Applic. Bus. Accounting. | 1 |
| Communication[3] | 3 |
| Natural Science[5] | 4 |
| Physical Education Elective | 1 |
| Free Elective[10] | 3 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ACC 210 Accounting I[1] | 3 |
| BUS 201(295B) Intro. Bus. Procedures | 3 |
| EC 201 Intro. to Economics[1] | 3 |
| MA 114 Finite Math | 3 |
| PSY 200 Intro. to Psychology | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ACC 220 Accounting II[1] | 3 |
| BUS/ST 350 Economics./Bus. Stat[1] | 3 |
| EC 202 Prob. & Issues | 3 |
| FL_ 201 Inter. Foreign Language | 3 |
| Humanities/Soc.Sci. Elective | 3 |
| Physical Education Elective | 1 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BUS 305 Legal & Reg. Environment | 3 |
| BUS 320 Financial Mgmt. | 3 |
| ENG 33x[11] Advanced Writing Elective | 3 |
| Natural Science[7] | 3 |
| Ethics Elective[6] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| BUS 330 Human Resource Mgmt. | 3 |
| BUS 335 Organizational Behavior | 3 |
| BUS/CSC 340 Info. Systems Mgmt. | 3 |
| BUS 360 Marketing Methods | 3 |
| BUS 370 Operations Mgmt. | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Business Concentration | 3 |
| Humanities/Soc.Sci. Elective[8] | 3 |
| Literature Elective[9] | 3 |
| Free Electives[10] | 6 |
| | 15 |

| *Fall Semester* | *Credits* |
|---|---|
| BUS 480 Business Policy & Strategy | 3 |
| Business Concentration | 6 |
| Free Elective[10] | 3 |
| | 12 |

Minimum Credit Hours Required For Graduation . . . . . 122

[1]A grade of "C-" or better is required.
[2]Students should select from among the History Electives List.
[3]Select one of the following: COM 110, 112, 146, 211.
[4]MA 131 or 141 may substitute for MA 121. MA 242 may substitute for MA 114.
[5]Students should select from the Natural Science (Basic) List (Biology, Chemistry, Earth Sciences, and Physics).
[6]Students can choose from the following: PHI 275, 311, 313, 314, 321, and 322.
[7]Students should select from the Natural Sciences Elective List, including, but not limited to, Biology, Chemistry, Earth Sciences, and Physics.
[8]One HSS course must be from the Science, Technology, and Society (Humanities and Social Science Perspective) List and the other course can be from the aforementioned list or the Humanities and Social Sciences Additional List.
[9]Students should select from among the Literature Electives List.
[10]Credit will not be allowed for FL 101, 102, or 105 (in the language in which proficiency requirement is met), and MA 101, 103, 105, 107, 108, and 111.
[11]ADVANCED WRITING ELECTIVE - Select one of the following: ENG 331 Communication for Engineering and Technology, ENG 332 Communication for Business Management, or ENG 333 Communication for Science and Research.
12

## MINOR IN BUSINESS MANAGEMENT

The Department of Business Management offers a minor in business management to any undergraduate student outside the College of Management. The minor provides students with basic knowledge in important areas of business management. Fifteen credit hours are required for the minor. Please contact the Academic Affairs office in Nelson Hall 114 for specific information about admission and other requirements.

# DEPARTMENT OF ECONOMICS

Patterson Hall, Room 201

R.B. Palmquist, *Head*

W.N. Thurman, *Director of Graduate Programs*

*Alumni Distinguished Undergraduate Professor*: M.B. McElroy; *Professors*: S.G. Allen, R.L. Clark, E.W. Erickson, D. Fisher, D.J. Flath, T.J. Grennes, A.R. Hall, D.M. Holthausen, D.N. Hyman, C.R. Knoeber, S.E. Margolis, R.B. Palmquist, D.K. Pearce, J.J. Seater, W.N. Thurman; *Adjunct Professor*: J.B. Hunt Jr.; *Professors Emeriti*: R.M. Fearn, B.M. Olsen, C.B. Turner; *Associate Professors*: D.S. Ball, L.A. Craig, A.E. Headen, J.S. Lapp, M.B. McElroy, C.M. Newmark, W.J. Wessels; *Assistant Professors*: A.P. Levy, T.C. Tsoulouhas; *Associate Member of the Faculty*: D.A. Dickey (Statistics).

The Department of Economics offers Bachelor of Arts and Bachelor of Science degrees in economics. Successful completion of an undergraduate degree in economics prepares a student for careers in business or government as well as for graduate and professional schools. Economics students can develop their understanding of economic issues in a variety of areas, including financial institutions, international trade and finance, labor and industrial relations, health care economics, industrial organization, environmental and natural resource economics, public finance, and economic history.

An economics degree is attractive to employers because it provides a rigorous analytical training with a broad understanding of the workings of the economic system. Its high degree of flexibility also allows students to tailor their education to specific interests and career goals. An undergraduate degree in economics has long served as the foundation for advanced professional degrees in business and law, as well as for graduate study in economics.

## ECONOMICS HONORS PROGRAM

The Honors Program in Economics is designed for academically talented and motivated students who desire a richer educational experience than offered in regular courses. The primary goal of this program is to help students develop the ability to apply economic analysis to issues involving choice at the individual, household, firm and government level. Admission to the program requires junior standing, completion of at least 30 hours at NC State with a 3.000 GPA, and grades of B or better in EC 201, 301, and 302. To graduate with honors in economics, a student must have at least a 3.250 overall GPA and 3.250 or better in all economics courses taken at NC State. In addition, the student must take the Honors Seminar (EC 490H)

and the honors section of at least two of the following courses: EC 201, EC 301, EC 302 or a faculty-initiated Honors Option EC course.

## CURRICULA

The Bachelor of Arts in economics is a broad and flexible program of study. The major course work for the Bachelor of Arts in economics includes 12 semester hours of economic theory and 14 hours of mathematics, statistics, and computer science. In addition, students study at least 18 semester hours of advanced, applied economics. The program provides for substantial flexibility so that students, in consultation with their faculty advisors, may tailor their studies to their particular interests and long term objectives.

The Bachelor of Science in economics puts particular emphasis on training in analytical methods in economics. It differs from the Bachelor of Arts by having less emphasis on the liberal arts and greater emphasis on courses in mathematics, science, and statistics.

A "General Policies" statement for all College of Management majors is available in Nelson Hall 114. It serves as an addendum to the curriculum requirements and describes GPA requirements for graduation, residency requirements, suspension policy, required grades in specific courses, course repeat policy, etc. Sample schedules for the bachelor's degrees in economics are given below.

## CURRICULUM IN ECONOMICS
## Degree earned: B.A. in Economics

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 111 Comp. & Rhetoric[1] | 3 |
| MA 121 Elements of Calculus[2] | 4 |
| FL_ 201 Inter. Foreign Language[3] | 3 |
| Natural Science[4] | 4 |
| Any 100-level PE in Fitness&Wellness [16] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 112 Comp. & Reading[1] | 3 |
| M 200 Micro Applic. BUS Accounting. | 1 |
| MA 114 Intro. to Finite Math[5] | 3 |
| History[5] | 3 |
| Natural Science[4] | 4 |
| Physical Education Elective | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CSC 200 Intro. to Computers | 3 |
| EC 201 Intro. to Economics | 3 |
| History[5] | 3 |
| Literature[7] | 3 |
| Social Science[6] | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| EC 202 Economics Problems & Issues | 3 |
| Literature[7] | 3 |
| Natural Science[4] | 4 |
| Phil., Relig.,Vis/Perf Arts Elective[8] | 3 |
| Physical Education Elective | 1 |
| | 14 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BUS/ST 350 Economics Bus. Stat.[10] | 3 |
| EC 301 Intermed. Microeconomics. | 3 |
| Advanced Writing[11] | 3 |
| Sci., Technology, and Soc. Elective.[9] | 3 |
| Social Science[6] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| EC 302 Intermed. Macroeconomics. | 3 |
| Advanced Comm.[13] | 3 |
| Advised Elective[14] | 3 |
| Economics Electives[12] | 6 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| EC 490[15] | 3 |
| Advised Electives[14] | 6 |
| Economics Elective[12] | 3 |
| Free Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| Advised Electives[14] | 6 |
| Economics Electives[12] | 6 |
| Free Electives | 5 |
| | 17 |

Minimum Hours Required for Graduation .....122

[1]"C's" or better in both ENG 111 and 112 (or ENG 112-H) are required.
[2]MA 131 or 141 may substitute for MA 121. MA 242 may substitute for MA 114. Students who qualify for MA 131 or 141 are encouraged to take one of these courses.
[3]Proficiency at the first-semester intermediate level (either through successful completion of FL_ 201 or appropriate placement by the Placement Test) in French, Spanish, German, Russian, Italian, Latin, Classical Greek, Biblical Hebrew, Japanese, Chinese, Portuguese or Swahili is required.
[4]Three courses from the GER Natural Sciences (Biology, Chemistry, Earth Sciences, Physics) list.
[5]Two courses from the GER History list.
[6]Two courses chosen from the following GER lists: Anthro.Politics and Govt., Psy., Cultural Geography, and Sociology.
[7]Two courses from the GER Literature list.
[8]One course chosen from one of the following GER lists: Philosophy, Religion, Visual and Performing Arts.
[9]One course from the Science, Technology and Society (Science and Technology Perspective) list.
[10]ST 361, or 372 may substitute for ST/BUS 350. Credit will not be given for more than one of these courses.
[11]Choose from: ENG 331, 332, or 333. Must be taken in JR year.
[12]15 hours of 300 and 400 level EC courses (except EC(ARE) 401) and 500 level ECG courses. No more than 6 hours of 300 level EC courses may be counted as economics electives.
[13]A second course chosen from the GER Advanced Writing list or a course chosen from the GER Communication/Speech list.
[14]15 hours chosen from any university course offerings except FL 101, 102, or 105 (in which proficiency requirement is met), or MA 101, 103, 105, 107, 108, or 111, or PE/PEH courses. Students are urged to discuss these courses with their adviser and to consider using these electives to pursue a minor.
[15]EC 490H or EC 498 may substitute for EC 490. Students who write a term paper in another EC or ECG course during their senior year may petition to substitute another economics elective for EC 490.

# CURRICULUM IN ECONOMICS
## Degree earned: B.S. in Economics

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 111 Comp. & Rhetoric[1] | 3 |
| History[4] | 3 |
| Math[2] | 4 |
| Natural Science[3] | 4 |
| Any 100-level PE in Fitness&Wellness[15] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 112 Comp. & Reading[1] | 3 |
| M 200 Micro. Applic. Bus. Accounting. | 1 |
| History[4] | 3 |
| Math[2] | 3 or 4 |
| Natural Science[3] | 4 |
| Physical Education Elective | 1 |
| | 15-16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| EC 201 Intro. to Economics | 3 |
| Literature[5] | 3 |
| Math[2] | 3 or 4 |
| Natural Science[3] | 4 |
| Physical Education Elective | 1 |
| | 14 -15 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 200 Intro. to Computers[6] | 3 |
| EC 202 Economics Problems & Issues | 3 |
| MA 114 Intro. Finite Math[2] | 3 |
| Literature[5] | 3 |
| Natural Science[3] | 4 |
| Physical Education Elective | 1 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BUS/ST 350 Economics. Bus. Stat.[9] | 3 |
| EC 301 Intermed. Microeconomics | 3 |
| Advanced Writing[8] | 3 |
| Natural Science[3] | 3 or 4 |
| Social Science[7] | 3 |
| | 15-16 |

| *Spring Semester* | *Credits* |
|---|---|
| EC 302 Intermed. Macroeconomics | 3 |
| Economics Elective[10] | 3 |
| Phil., Relig.,Vis/Perf Arts Elective[8] | 3 |
| Sci., Technology, and Soc. Elective.[11] | 3 |
| Free Elective | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| EC 451 Intro. Econometrics | 3 |
| Economics Electives[10] | 6 |
| Free Electives | 6 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| EC 490 Res. Seminar in Economics.[13] | 3 |
| Economics Elective[10] | 3 |
| Free Electives[14] | 7-10 |
| | 13-16 |

Minimum Hours Required For Graduation ..... 122

[1]"C's" or better in both ENG 111 and 112 (or ENG 112-H) are required.
[2]The mathematics requirement consists of four courses: a two course calculus sequence (either MA 131-231 or MA 141-241); MA 114 (MA 214 may substitute); and an elective from the following list (MA 242, 303, 305, 421)
[3]Select five courses from (including at least two different sciences): BO 200; BS(BIO) 105, 125; CH 101 (with 121 lab), 107 with 127 lab); MEA 101 (with 110 lab), 102 (with 111 lab), 130 (with 135 lab), 200; PY 131, 201, 202, 205, 208, 211, 212, 223 (with 225 lab); SSC 200; ZO 201, 212. ONE OF THE FOLLOWING TWO COURSE SEQUENCES MUST BE INCLUDED AMONG THE FIVE COURSES (where labs have separate numbers they are given in parentheses and must be taken): (I) CH 101 (121) & 107 (127); (ii) MEA 101 (110) & 102 (111); (iii) PY 201 & 202 or PY 205 & 208 or PY 211 & 212; (iv) ZO 201 & 212.
[4]Two courses from the GER History list. ***
[5]Two courses from the GER Literature list. ***

[6]CSC 101, 110, or 112 may substitute for CSC 200.
[7]One course chosen from the following GER lists: Anthropology, Politics and Government, Psychology, Cultural Geography, and Sociology. ***
[8]Choose from: ENG 331, 332, or 333. Must be taken in the JR year.
[9]ST 361, or 372 may substitute for BUS/ST 350.
[10]Economics electives may be chosen from 300 and 400 level EC courses (except EC/ARE 401) and 500 level ECG courses. At least 6 hours must be at the 400 or 500 level.
[11]One course from the GER Science, Technology and Society (Humanities and Social Sciences Perspective) list.
[12]One course chosen from one of the following GER lists: Philosophy, Religion, Visual and Performing Arts. ***
[13]EC 498 may substitute for EC 490. Students who write a term paper in another EC or ECG course during their senior year may petition to substitute an extra economics elective for EC 490.
[14]Choose enough free electives to bring total hours to at least 122.

*** At least one of these courses must come from the Non-English Speaking Culture list.

## MINOR IN ECONOMICS

The minor in economics is designed to give students a basic understanding of economic analysis and involve them in applied work in one or more fields of economics. The minor in economics is an excellent complement to many majors within the university, including political science, statistics, business, accounting, and engineering. To complete the minor in economics students must take EC 201 (or ARE 201), EC 301, EC 302, and two additional economics courses at the 300 level or higher for a total of 15 semester hours. Please contact the Academic Affairs office in Nelson Hall 114 for specific information about admission and other requirements.

# COLLEGE OF PHYSICAL AND MATHEMATICAL SCIENCES

*Cox Hall, Rooms 113-122*
*NCSU Box 8201*
*Raleigh, NC 27695-8201*

*Phone:* *(919) 515-7833*
*Fax:* *(919) 515-7855*
*Internet E-mail:* *pams@ncsu.edu*

J. L. Whitten, *Dean*

D. L. Solomon, *Associate Dean for Academic Affairs*

R. E. Fornes, *Associate Dean for Research*

R. G. Savage, *Assistant Dean for Academic Affairs*

W. P. Hill, *Coordinator for African-American Affairs*

The College of Physical and Mathematical Sciences offers programs for students whose interests lie in the basic as well as the applied science and mathematical areas. These programs of study and research are offered at both the undergraduate and graduate levels and can lead to many career opportunities. In addition, the College provides the core science and mathematical education support for the entire university. The College consists of five academic departments: Chemistry, Mathematics, Physics, Statistics and Marine, Earth and Atmospheric Sciences. It jointly administers academic programs in Biochemistry with the College for Agriculture and Life Sciences. The Center for Research in Scientific Computation, the Institute of Statistics, the Precision Engineering Center, and the Center for Advanced Electronic Materials Processing are also associated in whole or in part with the College.

Graduates of the College are in demand and valued for their well-developed analytical thinking and problem-solving skills. They are recruited for technical and administrative positions in industrial research and development laboratories, universities and colleges, non-profit research organizations, and government agencies. A large percentage of the graduates undertake advanced study in medical, law, business, or other professional schools as well as further study leading to the Master of Science and Doctor of Philosophy degrees.

The high school student who enjoys computers, mathematics, chemistry, geology, marine science, atmospheric science, or physics, who has an interest in natural phenomena and their fundamental descriptions, and who hopes to make a difference in the quality of life should consider the career opportunities in the physical and mathematical sciences.

## FACILITIES

Faculty and students make extensive use of computers for word processing, electronic mail, library services, and many other software packages and tools including access to the Internet. The College participates in the campus-wide computer workstation network and provides access to College workstations for all undergraduate and graduate majors. Individual departments provide computer services to their students, as well, for such things as weather modeling, environmental and satellite data acquisition, and data analysis. Students also have access to university facilities for additional workstations, peripherals, and services. Students receive personal accounts upon entering the university and are offered an introduction to the computing facilities during their first regular semester on campus.

Modern research facilities are also accessible and convenient to students in each department. These range from highly specialized laboratories such as those in solid state physics or nuclear magnetic resonance spectroscopy to state-of-the-art instruments such as X-ray diffractometers and electron spin resonance spectrometers. These laboratories are routinely utilized by advanced undergraduates taking part in research programs.

## CURRICULA

The College offers undergraduate programs of study leading to the Bachelor of Science degree with majors in chemistry, geology, mathematics, applied mathematics, meteorology, natural resources, environmental sciences, physics, and statistics and the Bachelor of Arts degree with majors in geology and chemistry. In some programs students may choose to highlight their studies with concentrations in compatible disciplines. For example, they may select a marine sciences concentration in physics, chemistry, geology, or meteorology; an air quality, environmental geology, or statistics concentration in an environmental sciences curriculum; or a geological resources or marine and coastal resources concentration in a natural resources curriculum.

Curricula within the College have similar freshman years, enabling a freshman to change, without loss of time, from one department to another in the College. A time-

limited Physical and Mathematical Sciences Undesignated (PMU) "curriculum" is offered to students who want to major in one of these curricula but have not yet made a decision.

Minors are offered in geology, mathematics, meteorology, physics, and statistics.

****University Physical Education requirements have been modified. It is recommended that students consult with their adviser on specific curriculum requirements regarding PE.*

## PRE-MEDICAL SCIENCES

Medical and dental schools as well as many other health-related professional schools have long regarded degree programs in the core physical and mathematical sciences as excellent "pre-professional" curricula. Some professional schools prefer the in-depth knowledge gained by this route over those curricula which offer a cursory view of a variety of topics. For further details, contact Dr. Daniel L. Solomon, Associate Dean for Academic Affairs.

## DUAL DEGREE PROGRAMS

Students may wish to earn bachelor's degrees in two fields within the College. Other students may wish to combine a bachelor's degree in the College with one in another NC State college or school. With effective planning, a number of courses can satisfy core, general education, or elective requirements simultaneously in both degree programs.

## SCHOLARS AND HONORS PROGRAMS

Academically talented high school seniors may be selected to participate in the College of Physical and Mathematical Sciences Scholars Program. Enriched courses, including chemistry, English, mathematics, and physics, have been developed specifically for program participants. Scholars and honors sections of classes are small, allowing for more intellectually stimulating student-to-student and student-to-faculty interactions. Weekly forum and field trips enrich the educational and cultural experiences of students.

Students taking upper-level courses in their major may, if they have a specified grade point average and recommendation of an upper-level course instructor, be invited to participate in a departmental Honors Program in order to create more individualized and challenging major academic programs. Participants elect to fulfill departmental Honors Program requirements by engaging in research projects and

more rigorous courses, often at the graduate level. In appropriate instances students receive graduate credit in the senior year toward the Master of Science degree for their honors work.

Completion of scholars and honors courses and programs is recognized on students' permanent transcripts.

Well-prepared students entering the College may seek advanced placement in biology, chemistry, computer science, foreign language, history, mathematics, or physics by passing qualifying examinations.

## DEPARTMENTAL HONORS PROGRAMS

(See departmental Biochemistry ( see College of Agriculture and Life Sciences), Chemistry, Marine, Earth and Atmospheric Sciences, Mathematics, Physics, Statistics)

## TUTORIAL AND AUDIO-VISUAL ASSISTANCE

Most of the departments in the College offer students some form of free tutorial assistance, including regularly scheduled review sessions and Supplemental Instruction (SI) for selected sections of chemistry, mathematics, and physics. Several departments provide facilities for students to use supplementary videotaped or computer-assisted instructional materials on a voluntary basis.

## STUDENT ACTIVITIES

In addition to university-wide extracurricular activities and honor organizations, the College of Physical and Mathematical Sciences has student chapters of the following professional and honor organization: Sigma Pi Sigma (Physics Honors Society); Society of Physics Students; Pi Mu Epsilon (National Mathematical Honorary Fraternity); Society for Undergraduate Mathematics (A Student Chapter of the Mathematical Association of America); Phi Lambda Upsilon (National Honorary Chemical Society); American Chemical Society; National Organization for the Professional Advancement of Black Chemists and Chemical Engineers; Mu Sigma Rho (Statistics Honorary Society); Statistics Club; American Meteorological Society; Society of Mining Engineers/Society of Exploration Geophysicists (Geology Club); National Association of Environmental Professionals (Student Chapter); and the nation's first chapter of the Society of African-American Physical and Mathematical Scientists.

## SCHOLARSHIPS

College of Physical and Mathematical Sciences majors may be eligible for a variety of freshman and undergraduate College and departmental scholarships in addition to those administered at the university level. The awards are based on a combination of factors, with a strong emphasis on academic excellence. Some scholarships are renewable for up to four years, and some carry opportunities for significant career-related work experience.

## GRADUATE STUDY

The Master of Science and Doctor of Philosophy degrees are available with majors in biomathematics, chemistry, marine, earth and atmospheric sciences, mathematics, applied mathematics, statistics, and physics. The Master of Biomathematics, Master of Chemistry, and Master of Statistics are also offered. The Departments of Statistics and Mathematics offer BS-MS programs which allow students to enroll in up to twelve credit hours of graduate level course work which may be applied toward the requirements of both the bachelor's and master's degrees.

## COOPERATIVE EDUCATION, FIELD EXPERIENCE, AND UNDERGRADUATE RESEARCH

The College recognizes the value of career-related work experience to students and encourages its majors to avail themselves of such opportunities whenever possible. That experience may be gained through the university's Cooperative Education Program, department sponsored field experience, academic research, and summer employment. Advisers work with students to develop a plan of study that balances a challenging course load with appropriate extracurricular activities.

## COMMUNITY OUTREACH

The College of Physical and Mathematical Sciences demonstrates its commitment to community outreach through its Science House on the NC State campus. The Science House offers programs for K-12 students and teachers to enhance their understanding of, appreciation for, and involvement in mathematics and the physical sciences. The Science House, located on the Centennial Campus, houses classrooms, laboratories and a teaching resource library. Vans from the Science House carry *Science on the Road* demonstration programs and teaching laboratory equipment to schools across North Carolina.

# DEPARTMENT OF BIOCHEMISTRY

(See College of Agriculture and Life Sciences)

# DEPARTMENT OF CHEMISTRY

Dabney Hall, Room 108 and Withers Hall

R. A. Osteryoung, *Head*

C. B. Boss, *Director of Undergraduate Studies*

R. J. Linderman, *Director of Graduate Studies*

R. W. Morrison Jr., *Executive Officer, Scheduling Officer*

*Glaxo Distinguished University Professor:* J. S. Lindsey: *Alumni Distinguished Undergraduate Professor:* F. C. Hentz, Jr; *Alumni Distinguished Undergraduate Professor Emeritus:* W. P. Tucker; *Professors:* A. J. Banks *(Coordinator of General Chemistry Laboratories)*, R. D. Bereman, E. F. Bowden, L. H. Bowen, C. L. Bumgardner, H. H. Carmichael, D. L. Comins, K. W. Hanck, S. G. Levine, R. J. Linderman, C. G. Moreland, J. G. Osteryoung, R. A. Osteryoung, S. T. Purrington, A. F. Schreiner, E. O. Stejskal, G. H. Wahl Jr. *(Coordinator of Organic Laboratories)*, M-H. Whangbo, J. L. Whitten; *Professors Emeriti:* G. O. Doak, L. D. Freedman, F. W. Getzen, Z. Z. Hugus, L. A. Jones, R. H. Leoppert, G. G. Long, M. L. Miles, R. C. White; *Associate Professors:* C. B. Boss, T. C. Caves, Y. Ebisuzaki, M. G. Khaledi, W. L. Switzer, D. W. Wertz *(Coordinator of General Chemistry)*; *Associate Professor Emeritus:* A. F. Coots; *Assistant Professors:* C. R. Cornman, D. L. Feldheim, C. B. Gorman, J. D. Martin, D. A. Shultz; B. Wang; *Assistant Professor Emeritus:* W. R. Johnston; *Research Assistant Professors:* M. Ciszkowska, J. J. O'Dea, R. W. Wagner, H. Yang; *Associate Faculty:* D. W. Brenner *(Materials Science and Engineering)*, J. D. Otvos *(Biochemistry)*; *Laboratory Supervisors:* P. D. Boyle, K. L. Colson, H. S. Gracz, C. A. Haney, G. L. Hennessee, S. S. Sincere, G. J. Shaw, J. T. Sigvaldsen; *Laboratory Demonstrator:* T. M. Vess; *Teaching and Research Technician:* D. E. Knight.

Chemistry is the science dealing with the composition, structure, and properties of all substances and changes that they undergo. Chemists have contributed to the synthetic fiber industry, petroleum products and fuels, plastics, the food processing industry, nuclear energy, electronics, modern drugs and medicine. Today's chemists are concerned with the fundamental building blocks of all materials - atoms and molecules - leading to improvement of old materials, development of substitutes or new ones, and an understanding of our material environment.

## OPPORTUNITIES

The chemical industry is the nation's largest manufacturing industry. Chemists comprise the largest proportion of scientists in the United States and future demand for chemists should continue to grow. A variety of jobs are open to the chemist: biochemistry and other biological areas, education, medicine, law, metallurgy, marine science, space science, oceanography, sales and management, pure research

and development. Chemists are employed in every field based on modern technology; opportunities for chemists in the field of education are many and varied.

## CURRICULA

The B.A. program offers a flexible course of studies for students who may not plan to become professional chemists but who desire an interdisciplinary program with an emphasis on chemistry. The proper choice of electives will prepare the graduate for any of the following: medical, veterinary or dental school; work in chemical sales and management; teaching in secondary schools; work in environmental science; or graduate school in an allied science. Since the first three semesters are essentially identical to those of the B.S. program, students may enter the B.A. program either directly from high school or some later point after entering the university.

The B.S. curriculum, accredited by the American Chemical Society, includes a strong, broad background in mathematics, physics and the liberal arts. The basic areas of organic, physical, inorganic and analytical chemistry are stressed. Laboratory and classroom work develop the skills, knowledge and inquiring spirit necessary for a successful career in chemistry. The advised elective credits allow individual diversity at the junior and senior levels. Many undergraduates participate in current departmental research through part-time employment or research projects. The B.S. curriculum prepares the student to enter the job market directly as a chemist or to enter various professional schools or graduate school in chemistry or an allied science. This route is also an excellent premedical program.

The Bachelor of Science in Chemistry-Marine Sciences Concentration provides students the knowledge associated with a B.S. degree in chemistry but also applies that knowledge to a natural environmental setting (in this case, the marine environment). Many students have an environmental awareness and a desire to pursue environmental issues along with their interest in physical science. This degree allows a student to take all of the courses necessary to become an accredited ACS (Americal Chemical Society) chemist along with the oceanography courses necessary to apply that chemical information to an interesting and complex environment like the ocean.

# CURRICULUM IN CHEMISTRY
## Degree earned: B.A. in Chemistry

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I[1] | 3 |
| CH 121 General Chemistry Lab I | 1 |
| ENG 111 Comp. and Rhetoric[1] | 3 |
| MA 141 Analytic Geom. & Calculus I[1] | 4 |
| Any 100-level PE in Fitness & Wellness [2] | 1 |
| PMS 100 Orientation to PAMS | 1 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II[1] | 3 |
| CH 127 General Chemistry Lab II | 1 |
| ENG 112 Comp. and Reading[1] | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| Humanities/Soc.Sci.Elective[3] | 3 |
| Physical Education Elective[2] | 1 |
| | 15 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 221 Organic Chemistry I[1] | 4 |
| PY 205 Physics for Engr. & Sci. I[1] | 4 |
| History Elective[4] | 3 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| Physical Education Elective | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II[1] | 4 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| Literature Elective[5] | 3 |
| Physical Education Elective | 1 |
| Free Elective | 3 |
| | 15 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 331 Introductory Physical Chemistry[1] | 4 |
| Advised Elective[6] | 4 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| Science Elective | 4 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 315 Quantitative Analysis[1] | 4 |
| Advised Elective[6] | 4 |
| Science Elective | 4 |
| Writing Elective[7] | 3 |
| | 15 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 401 Systematic Inorganic Chemistry. I | 3 |
| Advised Electives[6] | 6 |
| Humanities/Soc. Sci. Electives[3] | 6 |
| Free Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| BCH 451 Introductory Biochemistry | 4 |
| Advised Electives[6] | 4 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| Free Elective | 4 |
| | 15 |

Minimum Hours Required for Graduation ..... 120[2,8]

[1]D grades are NOT accepted in CH 101, CH 107, CH 221, CH 223, CH 315, CH 331, ENG 111, ENG 112, MA 141, PY 205.
[2]First two PE credits do not count toward minimum credit hours required for graduation..
[3]These courses, selected from University-approved General Education Requirements (GER) lists for Humanities and Social Sciences, must includes the following: one course (3 hours) from Philosophy, Religion, or Visual and Performing Arts; two courses (6 hours) representing two different areas in Anthropology, Cultural Geography, Economics, Politics and Government, Psychology, and/or Sociology; one course (3 hours) from the Science Technology and Society (Humanities and Social Sciences Perspective) list. At least one of the courses chosen to satisfy the Humanities and Social Sciences requirement must focus on a non-English speaking culture.
[4]To be selected from GER History Electives List.
[5]To be selected from GER Literature Electives List.

[6]Advised electives are designed to allow students to concentrate in areas related to academic or career goals. Courses used to fulfill this requirement are selected by students after consultation with and approval by their advisers or the Coordinator of Advising.
[7]To be selected from GER Advanced Writing List.
[8]All students must demonstrate foreign language proficiency at the FL_102 level.

## CURRICULUM IN CHEMISTRY
## Degree earned: B.S. in Chemistry

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 101 General Chemistry I[1] | 3 | CH 107 General Chemistry II[1] | 3 |
| CH 121 General Chemistry Lab I | 1 | CH 127 General Chemistry Lab I | 1 |
| CH 106 Computer Applic.Chemistry I | 1 | CH 108 Computer Applic. Chemistry II | 1 |
| ENG 111 Comp. and Rhetoric[1] | 3 | ENG 112 Comp. and Reading[1] | 3 |
| MA 141 Analytic Geom. & Calculus I[1] | 4 | MA 241 Analytic Geom. & Calculus II[1] | 4 |
| Any 100-level PE in Fitness&Wellness [2] | 1 | Humanities/Soc. Sci. Elective[3] | 3 |
| PMS 100 Orientation to PAMS | 1 | Physical Education Elective[2] | 1 |
| Humanities/Soc. Sci. Elective[3] | 3 | | 16 |
| | 17 | | |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 221 Organic Chemistry I | 4 | CH 211 Analytic Chemistry I | 3 |
| MA 242 Analytic Geom. & Calculus III[1] | 4 | CH 212 Analytic Chemistry I Lab | 1 |
| PY 205 Physics for Engr. & Sci. I[1] | 4 | CH 223 Organic Chemistry II[1] | 4 |
| History Elective[4] | 3 | MA 341 Diff. Equations I | 3 |
| Physical Education Elective | 1 | PY 208 Physics for Engr. & Sci. II[1] | 4 |
| | 16 | Physical Education Elective | 1 |
| | | | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 401 Syst. Inorganic Chemistry I | 3 | CH 402 Inorganic Chemistry Lab | 1 |
| CH 428 Qualitative Organic Analysis | 3 | CH 403 Syst. Inorganic Chemistry II | 3 |
| CH 431 Physical Chemistry I[1] | 3 | CH 433 Physical Chemistry II[1] | 3 |
| Advised Elective[5] | 3 | CH 434 Physical Chemistry Lab | 3 |
| Humanities/Soc. Sci. Elective[3] | 3 | Advised Elective[5] | 3 |
| | 15 | Humanities/Soc. Sci. Elective[3] | 3 |
| | | | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 415 Analytic Chemistry II | 3 | Advised Elective[5] | 3 |
| CH 416 Analytic Chemistry Lab | 1 | Humanities/Soc. Sci. Elective[3] | 3 |
| CH 435 Intro. Quantum Chemistry or | | Literature Elective[7] | 3 |
| PY 407 Intro. Modern Physics | 3 | Free Elective | 3 |
| Advised Elective[5] | 3 | | 12[8] |
| Writing Elective[6] | 3 | | |
| Free Elective | 2 | | |
| | 15 | | |

Minimum Hours Required for Graduation ..... 121[2,9]

[1]D grades are NOT accepted in CH 101, CH 107, CH 221, CH 223, CH 431, CH 433, ENG 111, ENG 112, MA 141, MA 241, MA 242, PY 205, PY 208.
[2]First two PE credits do not count toward minimum credit hours required for graduation.
[3]These courses, selected from University-approved General Education Requirements (GER) lists for Humanities and Social Sciences, must include the following: one course (3 hours) from Philosophy, Religion, or Visual and Performing Arts; two courses (6 hours) representing two different areas in Anthropology, Cultural Geography, Economics, Politics and Government, Psychology, and/or Sociology; one course (3 hours) from the Science, Technology and Society (Humanities and Social Sciences Perspective) list. At least one of the courses chosen to satisfy the Humanities and Social Sciences requirement must focus on a non-English speaking culture.
[4]To be selected from GER History Electives List.
[5]Advised electives are designed to allow students to concentrate in areas related to academic or career goals. Courses used to fulfill this requirement are selected by students after consultation with and approval by their advisers or the Coordinator of Advising.
[6]To be selected from GER Advanced Writing List.
[7]To be selected from GER Literature Electives List.
[8]This semester is deliberately light so that students will have time for research or other special projects and interests.
[9]All students must demonstrate foreign language proficiency at the FL_102 level.

## CURRICULUM IN CHEMISTRY
## MARINE SCIENCES CONCENTRATION[1]
## Degree earned: B.S. in Chemistry

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I[2] | 3 |
| CH 121 General Chemistry Lab I | 1 |
| CH 106 Computer Applic. Chemistry I | 1 |
| ENG 111 Comp. and Rhetoric[2] | 3 |
| MA 141 Analytic Geom. & Calc I[2] | 4 |
| Any 100-level PE in Fitness&Wellness[2] | 1 |
| PMS 100 Orientation to PAMS | 1 |
| Humanities/Soc. Sci. Elective[4] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry II[2] | 3 |
| CH 127 General Chemistry Lab II | 1 |
| CH 108 Computer Applic. Chemistry II | 1 |
| ENG 112 Comp. and Reading[2] | 3 |
| MA 241 Analytic Geom. & Calculus II[2] | 4 |
| Humanities/Soc. Sci. Electives[4] | 3 |
| Physical Education Elective[3] | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 221 Organic Chemistry I[2] | 4 |
| MA 242 Analytic Geom. & Calculus III[2] | 4 |
| MEA 200 Intro. to Oceanography[1] | 3 |
| MEA 210 Oceanography Lab[1] | 1 |
| PY 205 Physics for Engr. & Sci. I[2] | 4 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 211Analytical Chemistry I | 3 |
| CH 212 Analytical Chemistry I Lab | 1 |
| CH 223 Organic Chemistry II[2] | 4 |
| MEA 220 Marine Biology[1] | 3 |
| PY 208 Physics for Engr. & Sci. II[3] | 4 |
| Physical Education Elective | 1 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 401 Syst. Inorganic Chemistry I | 3 |
| CH 428 Qualitative Organic Analysis | 3 |
| CH 431 Physical Chemistry I[2] | 3 |
| MA 341 Diff. Equations I | 3 |
| Humanities/Soc. Sci. Elective[3] | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 402 Inorganic Chemistry Lab | 1 |
| CH 403 Syst. Inorganic Chemistry II | 3 |
| CH 433 Physical Chemistry II[2] | 3 |
| CH 434 Physical Chemistry Lab | 3 |
| MEA 323 Earth System Chemistry[1] | 3 |
| History Elective[5] | 3 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 415 Analytical Chemistry II | 3 |
| CH 416 Analytical Chemistry Lab | 1 |
| CH 435 Intro. Quantum Chemistry or | |
| PY 407 Intro. Modern Physics | 3 |
| MEA 473 Chemical Oceanography[1] | 3 |
| Writing Elective[6] | 3 |
| Free Elective | 1 |
| | 14 |

| *Spring Semester* | *Credits* |
|---|---|
| Humanities/Soc. Sci. Electives[4] | 6 |
| Literature Elective[7] | 3 |
| Free Elective | 3 |
| | 12[8] |

Minimum Hours Required for Graduation ..... 121[3,9]

[1]In the Marine Sciences concentration, the designated MEA courses constitute Advised Electives. This increases by one credit the requirement of the straight B.S. program. This increase is accommodated by decreasing free elective credits by one (to 4), keeping the minimum hours required for graduation at 121.

[2]**D** grades are NOT accepted in CH 101, CH 107, CH 221, CH 223, CH 431, CH 433, ENG 111, ENG 112, MA 141, MA 241, MA 242, PY 205, PY 208.

[3]First two PE credits do not count toward minimum credit hours required for graduation.

[4]These courses, selected from University-approved General Education Requirements (GER) lists for Humanities and Social Sciences, must include the following: one course (3 hours) from Philosophy, Religion, or Visual and Performing Arts; two courses (6 hours) representing two different areas in Anthropology, Cultural Geography, Economics, Politics and Government, Psychology, and/or Sociology; one course (3 hours) from the Science,Technology and Society (Humanities and Social Sciences Perspective) list. At least one of the courses chosen to satisfy the Humanities and Social Sciences requirement must focus on a non-English speaking culture.

[5]To be selected from GER History Electives List.

[6]To be selected from GER Advanced Writing List.

[7]To be selected from GER Literature Electives List.

[8]This semester is deliberately light so that students will have time for research or other special projects and interests.

[9]All students must demonstrate foreign language proficiency at the FL_102 level.

# DEPARTMENT OF MARINE, EARTH AND ATMOSPHERIC SCIENCES

Jordan Hall, Room 1125

L.J. Pietrafesa, *Head*

D.L. Wolcott, *Undergraduate Coordinator and Marine Sciences Undergraduate Programs*

E.F. Stoddard, *Geology Undergraduate Programs*

G.W. Watson, *Meteorology Undergraduate Programs*

*University Distinguished Scholar*: T.F. Malone; *Scholar in Residence*: R. Braham, *Alumni Distinguished Undergraduate Professor:* V.V. Cavaroc Jr.; *Professors*; S.P.S. Arya, V.V. Cavaroc Jr., J.M. Davis, D.J. DeMaster, R.V. Fodor, G.S. Janowitz, D.L. Kamykowski, L.J. Pietrafesa, S. Raman, V.K. Saxena, T.G. Wolcott; *Visiting Professors:* T.F. Clark, T.S. Hopkins, H. Reichle, D.A. Russell; *Adjunct Professors*:: A.H. Hines, R.K.M. Jayanty, S.K. LeDuc, R.V. Madala, P. Minnet, J.M. Pelissier, S. Riggs, W.H. Snyder, G.W. Thayer, *Professors Emeriti:* H.S. Brown, L.J. Langfelder, C.J. Leith, W.J. Saucier, C.W. Welby; *Associate Professors*: N.E. Blair, J.P. Hibbard, M.M. Kimberley, S.E. Koch, C.E. Knowles, E.L. Leithold, Y-L. Lin, J.M. Morrison, A.J. Riordan, F.H.M. Semazzi, P-T. Shaw, W.J. Showers, E.F. Stoddard, G.F. Watson, D.L. Wolcott; *Research Professor*: V. Aneja; *Visiting Associate Professors*: E.N. Buckley, V.S. Connors, M.L. Kaplan; *Adjunct Associate Professors*: M.G. Bevis, S. Businger, S. Chang, R.S. Harmon, L.A. Levin, R. Wiener; *Assistant Professors:* T.G. Drake, D.B. Eggleston, D.G. Evans, S.W. Snyder; *Visiting Assistant Professors*: R.P. Weglarz, L. Xie; *Adjunct Assistant Professors*: W.G. Ambrose, D.E. Checkley, T.B. Curtin, A.F. Hanna, G.J. Kirkpatrick, J.C. Reid, S. Ross, R.J. Wayland

The Department of MEAS covers a broad range of disciplines with one overarching goal: a deeper understanding of the Earth's environment. MEAS takes an interdisciplinary approach to studying our planet's air, earth and water, combining meteorology, earth science, and oceanography in a single department.

This interdisciplinary viewpoint is particularly important today, in light of accelerating global changes and increasing corporate and public interest in environmental health and wise use of natural resources. Many pressing questions require more than narrow training in a single discipline. MEAS graduates can be equipped for tasks as diverse as improving severe storm forecasting; assessing potential effects of oil exploration; modeling global climate trends or coastal flooding; understanding the transport of tree-killing air pollutants from industrial centers to the North Carolina mountains; developing non-polluting technology for mining; investigating global ozone depletion, or devising plans to minimize erosion and pollution of coastlines.

MEAS offers degrees in meteorology, geology, environmental sciences and natural resources. Marine sciences concentrations, which are highly interdisciplinary

curricula, are available in chemical oceanography, physical oceanography, coastal geology, and marine meteorology. Earth science courses encompass the entire earth, from the core, through the crust, to the minerals, sediments, groundwater, and landforms of the surface. Tools learned allow students to understand and characterize the physical and historical earth. Other courses provide knowledge to explain the internal forces of the Earth, and to investigate the Earth by measuring physical phenomena like gravity, magnetism, heat, electricity and acoustic waves. Coursework in all areas of geology equip students to reduce potential disasters from geological hazards and to ameliorate the negative impact of human society on the geological resources of the earth. Meteorology training teaches students how the atmosphere functions, and how to address problems like air pollution, climate changes, and severe weather, such as thunderstorms, tornadoes, winter storms, and hurricanes. Forecasting and climate studies are enhanced by using real-time satellite imagery, radar-data products, and state-of-the-art computer technology. MEAS majors in Environmental Sciences and Natural Resources fill a unique need in today's society as experts who can interpret their science to public policy shapers and decision-makers. The training they receive in economics, political science, and policy issues, and management (for Natural Resources majors) equips MEAS graduates to interact with industry, and with regulatory and conservation agencies.

Planet Earth is MEAS's natural laboratory. While most scientists conduct experiments under controlled conditions designed to replicate some facets of nature, we use ships, submarines, aircraft, and satellites and unattended monitoring instruments to directly and remotely probe the natural environment itself. Computer modeling helps us visualize the real-world information, and to design the next experiments. Field study is an integral part of MEAS educational programs, enabling students to apply concepts learned in the classroom to projects in the field. Summer field courses take students to the Southwest or to the North Carolina coast for intensive training in field methods. Shorter field trips are part of classes in all disciplines.

## OPPORTUNITIES

*Careers:* MEAS undergraduate degree programs provide talented students with the foundation of scientific knowledge for careers in government, industry or academe. These undergraduate curricula also prepare students to pursue graduate or professional degrees. Careers are open to all genders and races.

Graduates with a focus on marine sciences and oceanography may conduct pure and applied research, serving as environmental consultants for industry and governmental agencies, policy and management experts for governmental agencies; and environmental science educators. Graduates with a Natural Resources degree are versed in the fundamental processes and interdisciplinary nature of the coastal zone. As scientists, managers, administrators and regulators, they make decisions regarding use and conservation of coastal and marine resources.

Geology graduates address society's needs for water supply and water quality, from residential and industrial supply and disposal to ecosystem health in rivers and estuaries; they work for engineering firms and permit-issuing agencies; and they are recruited by industries that rely on geological resources. Those with Environmental Science degrees are trained to assess and monitor geological resources like wetlands and hazards like groundwater contamination, while those with Natural Resources degrees become resource managers involved in policy-making decisions. Marine geologists are experts in the complex issues facing industry, municipalities and residents in the dynamic and ecologically-vulnerable coastal zone.

Meteorology graduates may enjoy careers in weather forecasting, air quality assessment, weather products and services, broadcast communications, and advanced research. Using Doppler radar, forecasters are now able to predict severe weather with unprecedented accuracy. Marine meteorologists study ocean-generated weather systems. Their research is yielding practical benefits like refined prediction of storm surge, which has streamlined evacuation efforts during severe storms along the Carolina coast.

Environmental Sciences graduates with a meteorology emphasis may work for environmental firms. Study of air quality and how air pollution is transported and dispersed is a rapidly expanding field in the atmospheric sciences.

MEAS graduates play a key service role for the State of North Carolina, assisting in everything from analyzing the impact of atmospheric pollutants on agriculture and our estuaries, to determining the effects of toxic waste disposal on quality of surface and ground water.

## MEAS HONORS PROGRAM

Participants receive enhanced coverage of academic material and are involved in research. Eligibility is based on scholastic achievement. Minimum requirements are a GPA of 3.500 overall and 3.500 in the major, including required mathematics,

chemistry and physics courses taken to date. Students are reviewed for eligibility after the first semester of the sophomore year and again as first-semester juniors. Participation is optional. To successfully complete the honors program, a student will acquire a minimum of 9 credit hours of honors work, including 3 to 6 hours of independent study culminating in a written scientific report, and one of the following options: oral presentation in the department, a poster presentation at the Sigma XI Undergraduate Research Symposium, or presentation at a professional meeting. The remaining honors credit is earned in honors' sections of undergraduate courses, and in advanced (graduate) courses. Students must graduate with a 3.400 grade point average overall.

## UNDERGRADUATE RESEARCH, COOPERATIVE EDUCATION AND INTERNSHIPS

Honors Program participants, as many as 10 percent of MEAS undergraduates, obtain valuable experience assisting with research projects. Examples of past research projects include studies of coral reef fish in the Bahamas to understand age, growth and life history transitions; assessment of Lake Victoria's impact on the climate of East Africa; examination of the relationship between atmospheric ozone and meteorological parameters as measured with instrumented balloons; experiments on generation of oxygen from moon rocks to supplement a manned moon station; and reconstruction of events during past volcanic eruptions on Hawaii.

Outstanding MEAS students can receive career training with pay through the NC State Cooperative Education program, after completing the first year of undergraduate studies. Co-op and internship students have completed assignments with the National Weather Service, US Geological Survey, US Air Force, US Environmental Protection Agency, NC Museum of Natural Sciences, NC Division of Marine Fisheries, NASA, local environmental consulting firms, and other state and federal agencies. Many students co-op or intern at the internationally renowned Research Triangle Park. After graduation, co-op students often are hired full-time by the same companies or agencies.

## FACILITIES

The home base of MEAS is Jordan Hall, a recently built, award-winning structure that accommodates regular and televideo classrooms, teaching laboratories, research laboratories, computing facilities, and offices of faculty and staff. Jordan Hall has several facilities housing networked computers, some for unstructured student use,

and some, like the Weather Analysis and Forecasting Laboratory, for teaching. From the rooftop Weather Observatory, weather facsimile data is received and weather balloons launched. Other new structures include the Research III building on NC State's Centennial Campus, which houses the Facility for Ocean and Atmospheric Modeling and Visualization (FOAM-V). This is a massively-parallel supercomputing center supporting teaching, research and extension, especially in the MEAS focus on air-sea interaction. Research III also houses National Weather Service staff, who generate detailed wind data from a NEXRAD Doppler Radar. Upper-division students in the meteorology program are on standby during severe weather conditions to assist and observe at the NWS. For classwork and field research in coastal settings, students may look forward to completion of NC State's Center for Marine Sciences and Technology on the shore of Bogue Sound, in Morehead City, in 1998.

Students who attend a research-intensive ("Research I") university benefit from the opportunity to engage in research as undergraduates and to study with professors whose involvement in research keeps their knowledge and enthusiasm fresh. The faculty of MEAS are internationally-acknowledged research scientists, and the Department maintains an extensive inventory of both laboratory and field research equipment and facilities. As a member of the Duke/UNC Oceanographic Consortium, MEAS has access to the *R/V Cape Hatteras*, a 135' coastal oceanographic research vessel, which serves as a platform for work on the physics, chemistry, geology, biology and meteorology of the sea from New England to Central America and as far out as Bermuda. Specialized equipment in the department supports teaching and research in: geological materials (electron microprobe, X-ray fluorescence spectrometer, an automated X-ray diffractometer, neutron activation analysis), geophysical measurements (GPS, gravimeter, magnetometer, seismic reflection), and sedimentology (microcomputer-controlled grain-size analysis). Stable- and radio-isotope laboratories support research in biogeochemical cycling, paleoclimatology and paleoecology. Ecological studies are supported by a Motion Analysis System, a biotelemetry laboratory, and the departmental membership in the Cooperative Institute of Fisheries Oceanography, a joint venture of NOAA's National Marine Fisheries Service and a number of universities within the state. Advancements in Air-Sea Interactions come through the Satellite Oceanography and Image Analysis Laboratory; the Physical Oceanographic Research Laboratory with its complement of equipment to monitor the oceans' motion and composition; the Planetary Boundary-Layer Laboratory with its instrumentation for monitoring physical processes at the land-air and sea-air interfaces; the Man-Interactive Data

Acquisition System for experiments in severe storm forecasting and regional weather forecasting; and the FOAM-V facility. All programs benefit from access to massive computing power including the North Carolina Supercomputing Center, supported by a wide assortment of computer graphics devices and remote terminals and print services.

The MEAS World Wide Web home page is located at:
http://www2.ncsu.edu/ncsu/pams/meas/

## CURRICULA

The B.A. and B.S. degree programs in geology require similar geology courses, but differ in their content of social-humanities, mathematics, and collateral physical sciences. The B.A. program is designed to be similar to a B.S. degree in geology obtained from other universities, while the B.S. program is more technically oriented, and similar to other curricula in the physical sciences at NC State. The B.S. degree program in meteorology also follows the pattern of physical sciences curricula. Marine science tracks follow the patterns of the basic curricula in respective areas of concentration.

## CURRICULUM IN GEOLOGY
## Degree earned: B.A. in Geology

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ENG 111 Comp & Rhetoric | 3 | CH 101 General Chemistry I | 3 |
| MA 131 Analytical Geom. & Calculus A | 4 | CH 121 General Chemistry I Lab | 1 |
| MEA 101 Geology I: Physical | 3 | ENG 112 Comp. and Reading | 3 |
| MEA 110 Geology I Lab | 1 | MEA 102 Geology II: Historical | 3 |
| Any 100-level PE in Fitness & Wellness [10] | 1 | MEA 111 Geology II Lab. | 1 |
| PMS 100 Perspectives on Learning | 1 | Social Science Elective[1] | 3 |
| History/Literature Elective[1] | 3 | Physical Education Elective | 1 |
| | 16 | | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CSC 200 Intro. Computers & Use[3] | 3 | CH 107 General Chemistry II | 3 |
| MEA 330 Crystallogr. & Mineralogy | 5 | CH 127 General Chemistry II Lab | 1 |
| Math/Statistics Option[2] | 3 | COM 110 Public Speaking | 3 |
| Social Science Elective[1] | 3 | MEA 440 Igneous. & Meta. Petrol. | 4 |
| Physical Education Elective | 1 | History/Literature Elective[1] | 3 |
| Free Elective | 3 | Physical Education Elective | 1 |
| | 18 | | 15 |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| MEA 450 Sediment Pet. & Strat. | 4 | MEA 451 Structural Geology | 4 |
| PY 211 College Physics I | 4 | Earth Science Elective[5] | 3 |
| Advanced Writing[4] | 3 | Science Option[6] | 4 |
| Phil.,Relig.,Vis/Perf. Arts Elective[1] | 3 | Humanities/Soc. Sci. Elective[1] | 3 |
| Free Elective | 3 | | 14 |
| | 17 | | |

SUMMER SESSION

MEA 465, 466 Geologic Field Camp I, II. ..... 6

SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| Advised Elective[8] | 3 | MEA 491 Senior Seminar | 2 |
| Earth Science Elective[5] | 3 | Advised Elective[8] | 3 |
| Humanities/Soc. Sci. Elective[1] | 3 | Earth Science Elective[5] | 3 |
| Phil./History. of Sci. Option[7] | 3 | Humanities/Soc. Sci. Elective[1] | 3 |
| Free Elective | 3 | Free Elective | 3 |
| | 15 | | 14 |

Minimum Hours Required for Graduation ..... 128[9,10]

[1]These courses must be selected from the approved G.E.R. Listings for Social Sciences and Humanities and must include the following: 6 Hours in History and/or Literature; 6 Hours representing two different areas in Economics, Political Science, Government, Sociology, Anthropology, and/or Cultural Geography; and 3 Hours in Philosophy, Religion or Visual & Performing Arts.

At least one of your total selection of Social Sciences and Humanities courses must deal with a non-English speaking culture, and three of your total selection of the Social Sciences and Humanities courses must be beyond the introductory level.

[3]One of the following: MA 231, 114; ST 311.

[3]The following may be substituted for CSC 200: 1) E 115 plus CSC 110; b) E 115 plus CSC 112.

[4]ENG 331 or ENG 332 or ENG 333.

[5]Earth Science courses at the 300 level or above. Select electives in consultation with your advisor.

[6]One of the following: PY 212; BIO 125, BO 200; SSC 200.

[7]Any course from the Science, Technology, and Society (Humanities & Social Sciences Perspective) G.E.R. listing.

[8]Advised Electives may be in geology or in a supporting field. Select in consultation with advisor.

[9]Must also have demonstrated foreign language proficiency at the FL 102 Level

[10]First two PE credits do not count toward minimum credit hours required for graduation.

# CURRICULUM IN GEOLOGY
## Degree earned: B.S. in Geology

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytical Geom. & Calculus I | 4 |
| MEA 101 Geology I: Physical | 3 |
| MEA 110 Geology I Lab | 1 |
| Any 100-level PE in Fitness & Wellness [10] | 1 |
| PMS 100 Perspectives on Learning | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ENG 112 Comp. and Reading | 3 |
| MA 241 Analytical Geom. & Calculus II | 4 |
| MEA 102 Geology II: Historical | 3 |
| MEA 111 Geology II Lab | 1 |
| Physical Education Elective | 1 |
| | 16 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MA 242 Analytical Geom. & Calculus III | 4 |
| MEA 330 Crystallogr. & Mineral | 5 |
| Computer Science Option[1] | 3 |
| History/Literature Elective[2] | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| MEA 440 Igneous & Meta. Petrol. | 4 |
| PY 205 Physics Engr. & Sci. I | 4 |
| History/Literature Elective[2] | 3 |
| Statistical Science Option[2] | 3 |
| Physical Education Elective | 1 |
| | 15 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 333 Comm. for Sci. & Researchers.[4] | 3 |
| MEA 450 Sediment Pet. & Strat. | 4 |
| PY 208 Physics Engr. & Sci. II | 4 |
| Social Science Elective[2] | 3 |
| | 14 |

| *Spring Semester* | *Credits* |
|---|---|
| COM 110 Public Speaking | 3 |
| MEA 451 Structural Geology | 4 |
| Math/Sci. Elective[6] | 3 |
| Social Science Elective[2] | 3 |
| Technical Elective A[5] | 3 |
| | 16 |

### SUMMER SESSION

MEA 465, 466 Geologic Field Camp I, II ..... 6

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Earth Science Elective[7] | 3 |
| Phil.,Relig., Vis/Perf. Arts Elective[2] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Technical Elective B[5] | 3 |
| Free Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| MEA 491 Senior Seminar | 2 |
| Earth Science Elective[7] | 3 |
| Earth Science Elective[7] | 3 |
| Humanities/Soc. Sci.. Elective[2] | 3 |
| Free Elective | 3 |
| | 14 |

Minimum Hours Required for Graduation ..... 127[3,10]

[1]Computer Science Option to be selected from among: a) E 115 plus CSC 110; b) E 115 plus CSC 112; and c) CSC 200.
[2]These courses must be selected from the approved G.E.R. Listings for Social Sciences and Humanities and must include the following: 6 Hours in History and/or Literature; 6 Hours representing two different areas in Economics, Political Science,

Government, Sociology, Anthropology, and/or Cultural Geography; and 3 Hours in Philosophy, Religion or Visual & Performing Arts.

At least one of your total selection of Social Sciences and Humanities courses must deal with a non-English speaking culture, and three of your total selection of the Social Sciences and Humanities courses must be beyond the introductory level.

[3]Statistical Science Option to be selected from among ST 301, ST 361, and ST 371.

[4]ENG 331 or ENG 332 may be substituted for ENG 333.

[5]Technical Elective is a paired two-course sequence in a related field. Examples include: Physics (*e.g.* PY 411 and 412; PY 407 and 441); Astronomy (*e.g.* PY 223 and 240); Biological Sciences (*e.g.* BO 200 and 360; BIO 125 and ZO 220); Civil Engineering (*e.g.* CE 214 and 215; Soil Science (*e.g.* SSC 200 and SSC 361); Economics (e.g. EC 201 and 202); Anthropology (*e.g.* ANT 251 and 253); Computer Science (*e.g.* CSC 201 and 202); Chemistry (*e.g.* CH 331 and 401; CH 223 and 428, provided CH 221 has been taken to fulfill the Math/Science Option requirement); Mathematics (*e.g.* MA 225 and 403); Microbiology (*e.g.* BIO 125 and MB 351, provided CH 220 has been taken to fill the Math/Science Option; Statistics (*e.g.* ST 302 and 432 or ST 372 and 432, provided ST 301 or ST 371 has been used to fulfill the Statistical Science Option requirement); Meteorology (*e.g.* MEA 130 and 311); Marine Science (*e.g.* MEA 200 plus any one of MEA 220, 250, 323, 411, 460, 473 or 510). Courses used to fulfill other requirements may not be applied to the Technical Elective requirement.

[6]Math/Science Option to be selected from among CH 220, 221, 315, 331, 431; MA 305, 341, 421; PY 407, MAE 301; CSC 302; CE 213; ST 302.

[7]Earth Science Electives are above the 300 level.

[8]One of these must include a course from the Science, Technology, and Society (Humanities & Social Sciences Perspective) G.E.R. listing.

[9]Must also have demonstrated foreign language proficiency at the FL_102 Level.

[10]First two PE credits do not count toward minimum credit hours required for graduation.

## CURRICULUM IN GEOLOGY, MARINE SCIENCES CONCENTRATION
## Degree earned: B.S. in Geology

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytical Geom. & Calculus I | 4 |
| MEA 101 Geology I: Physical | 3 |
| MEA 110 Geology I Lab | 1 |
| Any 100-level PE in Fitness & Wellness [10] | 1 |
| PMS 100 Perspectives on Learning | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ENG 112 Comp and Reading | 3 |
| MA 241 Analytical Geom. & Calculus I | 4 |
| MEA 102 Geology II: Historical | 3 |
| MEA 111 Geology II Lab | 1 |
| Physical Education Elective[1] | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MA 242 Analytical Geom. & Calculus III | 4 |
| MEA 200 Intro. to Oceanography | 3 |
| MEA 210 Intro. to Oceanography Lab | 1 |
| MEA 330 Crystallogr. & Mineral | 4 |
| History/Literature Elective[2] | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 200 Intro. to Computers | 3 |
| MEA 250 Intro. Coastal Environ.[7] | 3 |
| MEA 440 Igneous and Meta. Petrol. | 4 |
| PY 205 Physics Engr. & Sci. | 4 |
| Physical Education Elective | 1 |
| | 15 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MEA 450 Sediment Petr. & Strat. | 4 |
| MEA 473 Chemical Oceanography | 3 |
| PY 208 Physics Engr. & Sci. II | 4 |
| Social Science Elective[2] | 3 |
| | 14 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 333 Comm. for Sci. & Researchers. | 3 |
| MEA 451 Structural Geology | 4 |
| Statistical Science Option[4] | 3 |
| MEA Restricted Elective[3] | 3 |
| Social Science Elective[2] | 3 |
| | 16 |

SUMMER SESSION

MEA 465, 466, Geologic Field Camp I, II ..... 6

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MEA 411 Marine Sed. Transport | 3 |
| MEA 460 Intro. Phys. Ocean | 3 |
| Geophysics Option[5] | 3 |
| Humanities/Soc. Sci.. Elective[6] | 3 |
| MEA Restricted Elective[3] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| MEA 491 Senior Seminar | 2 |
| Phil.,Relig.Vis/Perf. Arts Elective[1] | 3 |
| History/Literature Elective[2] | 3 |
| Humanities/Soc. Sci.. Elective[6] | 3 |
| MEA RestrictedElective[3] | 3-4 |
| | 14-15 |

Minimum Hours Required for Graduation ..... 127[7]

[1]Under the university general education requirements, credits for the first two physical education courses are not counted in computation of the minimum number of credits required for graduation.

[2]These courses must be selected from the approved GER listing for Social Science and Humanities as follows: *6 hours* in History and/or Literature and *6 hours* representing *two* different areas in Economics, Political Science, Government, Sociology, and/or Cultural Geography. At least *one* of the total selection of 21 hours of Social Science and Humanities courses must deal with a non-English speaking culture.

[3]MEA Restricted Elective to be selected from MEA 323 or MEA 510, or any 400- or 500-level MEA course in Earth Science or Marine Science.

[4]Statistical Science Option to be selected from among ST 301, ST 361, and ST 371.

[5]To be selected from among MEA 470, MEA 471, and MEA 476.

[6]One of these courses to be selected from the approved GER Science, Technology, and Society (Humanities and Social Science Perspective) List.

[7]Students must have demonstrated foreign language proficiency at the FL_ 102 level.

## MINOR IN GEOLOGY

The Department of Marine, Earth and Atmospheric Sciences offers a Minor in Geology to majors in any field except geology (GYA, GYM, & GYS). Admission to the program requires a grade of C or better in MEA 101 and MEA 110. Successful completion of the program requires a grade of C or better in at least 14 hours of geology courses beyond the first semester including at least two lab courses. Contact the department (515-7776) for added information and consultation with a minor advisor.

# CURRICULUM IN METEOROLOGY
## Degree earned: B.S. in Meteorology

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytical Geom. & Calculus I | 4 |
| Any 100-level PE in Fitness & Wellness | 1 |
| PMS 100 Perspectives on Learning | 1 |
| Humanities/Soc. Sci. Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II[3] | 3 |
| ENG 112 Comp. &Reading | 3 |
| MA 241 Analytical Geom. & Calculus II | 4 |
| PY 205 Physics Engr. & Sci. I | 4 |
| Physical Education Elective | 1 |
| | 15 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MA 242 Analytical Geom. & Calculus III | 4 |
| MEA 311 Physical Climatology | 3 |
| MEA 313 Meteorology Lab I | 1 |
| PY 208 Physics Engr. and Sci. II | 4 |
| Literature or History Elective[2] | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| MA 341 Applied Diff. Equations I | 3 |
| MEA 312 Physical Meteorology | 3 |
| MEA 314 Meteorology Lab II | 1 |
| Approved Elective[4] | 3 |
| Geophysical Science Elective[5] | 3 |
| Literature or History Elective[2] | 3 |
| | 16 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| E 115 Computing Environ. | 1 |
| ENG 333 Comm. Sci. & Researchers. | 3 |
| MEA 421 Atmospheric Dynamics I | 4 |
| ST 380 Prob. & Stat. Phys. Sci. | 3 |
| Approved Elective[4] | 3 |
| Physical Education Elective | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 112 Intro. Comp FORTRAN | 3 |
| MEA 405 Climatol Data Analysis | 3 |
| MEA 412 Atmospheric Physics | 3 |
| MEA 422 Atmospheric Dynamics II | 4 |
| Approved Elective[4] | 3 |
| | 16 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MEA 443 Weather Analytical & Fcstg. I | 3 |
| MEA 455 Micrometeorology | 3 |
| Approved Elective[4] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Social Science Elective[1,2] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| Approved Elective[4] | 3 |
| Free Elective | 3 |
| Meteorology Technical Elective[6] | 3 |
| Phil.,Relig.Vis/Perf. Arts Elective[2] | 3 |
| Sci., Technology & Soc. Elective[7] | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 122[8,9]

[1]Social Science Electives must include two courses or the equivalent from different content areas in the study of psychology, economics, politics and government, sociology, anthropology and cultural geography.
[2]At least one of the Humanities or Social Science courses must focus on a non-English speaking culture.

[3]Students who intend to take additional chemistry courses, or who plan technical electives which require additional chemistry, should add the lab course CH 127. Advanced transfer students are permitted to substitute mathematics, science, or engineering credits for CH 107.
[4]Approved Electives constitute a minor field of emphasis consisting of at least 15 credit hours in a single discipline or related disciplines. These include, but are not limited to: biometeorology, chemistry, computer science, environmental quality, geology-geophysics, hydrology, mathematics, physics, physical oceanography, statistics; several areas of engineering, agriculture, forestry; science education; weather communication.
[5]Geophys Sci Elective is selected from among MEA 101, MEA 200, PY 223, SSC 200.
[6]Meteorol Tech Elective: MEA 444, Weather Analysis and Forecasting II; or MEA 556, Air Pollution Meteorology.
[7]This course should be taken from among those offered from a Humanities or Social Science perspective.
[8]Students must have demonstrated foreign language proficiency at the FL_ 102 level.
[9]First two PE credits do not count toward minimum credit hours required for graduation.

## CURRICULUM IN METEOROLOGY, MARINE SCIENCE CONCENTRATION
## Degree earned: B.S. in Meteorology

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry Lab | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytical Geom. & Calculus I | 4 |
| Any 100-level PE in Fitness & Wellness | 1 |
| PMS 100 Perspectives on Learning | 1 |
| Humanities/Soc. Sci. Elective[1] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| ENG 112 Comp. and Reading | 3 |
| MA 241 Analytical Geom. & Calculus II | 4 |
| PY 205 Physics Engr. & Sci. I | 4 |
| Physical Education Elective | 1 |
| | 15 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MA 242 Analytical Geom. & Calculus III | 4 |
| MEA 200 Intro. Oceanography | 3 |
| MEA 210 Intro. Oceanography Lab | 1 |
| MEA 311 Physical Climatology | 3 |
| MEA 313 Meteorology Lab I | 1 |
| PY 208 Physics Engr. & Sci. II | 4 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| MA 341 Applied Diff. Equations I | 3 |
| MEA 312 Physical Meteorology | 3 |
| MEA 314 Meteorology Lab II | 1 |
| Geophysical Science Elective[2] | 3 |
| Humanities/Soc. Sci. Elective[1] | 3 |
| Humanities/Soc. Sci. Elective[1] | 3 |
| Physical Education Elective | 1 |
| | 17 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| E 115 Computing Environ. | 1 |
| ENG 333 Comm. Sci. & Researchers. | 3 |
| MEA 421 Atmospheric Dynamics I | 4 |
| MEA 460 Intro. Physical Ocean | 3 |
| ST 380 Statistics for Phys Science. | 3 |
| Physical Education Elective | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 112 Intro. to FORTRAN Pgm. | 3 |
| MEA 405 Climatol. Data Analysis | 3 |
| MEA 412 Atmospheric Physics | 3 |
| MEA 422 Atmospheric Dynamics II | 4 |
| MEA 462 Observa. Methods and Data Analysis | 3 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MEA 443 Weather Analysis & Fcstg. I | 3 |
| MEA 455 Micrometeorology | 3 |
| Approved Elective | 3 |
| Sci., Technology. & Soc. Elective | 3 |
| Social Science Elective[1] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| MEA 467 Marine Meteorology | 3 |
| Humanities/Soc. Sci. Elective[1] | 3 |
| Meteorology Technical Elective[3] | 3 |
| Phil.Relig.Vis./Perf. Arts Elective | 3 |
| Free Elective | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 123[4,5]

[1]At least one Humanities or Social Science course must focus on a non-English speaking culture.
[2]Geophys Sci Elective is selected from among MEA 101, PY 124, SSC 200, and CE 200.
[3]Meteorol Tech Elective: MEA 444, Weather Analysis and Forecasting II; or MEA 556, Air Pollution Meteorology.
[4]Students must have demonstrated foreign language proficiency at the FL_ 102 level.
[5]First two PE credits do not count toward minimum credit hours required for graduation.

## MINOR IN METEOROLOGY

The Department of Marine, Earth and Atmospheric Sciences offers a Minor in Meteorology to majors in any field except meteorology. Admission to the program requires a grade of C or better in MA 141, 241, and 242 and in PY 205 and 208. Successful completion of the program requires a grade of C or better in at least 15 credit hours of meteorology courses at the 300 level or above. These courses must include courses MEA 421 and MEA 422. Other courses taken should be selected in consultation with meteorology faculty. Contact the department for information (515-7776).

## CURRICULUM IN NATURAL RESOURCES
## GEOLOGICAL RESOURCES CONCENTRATION
## (See Interdisciplinary Programs)
## Degree earned: B.S. in Natural Resources

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| E 115 Computing Environ. | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 131 Analytical Geom. Calculus I | 4 |
| MEA 101 Geology I: Physical | 3 |
| MEA 110 Geology I Lab | 1 |
| NR 100 Intro. to Natural Res. | 2 |
| Any 100-level PE in Fitness & Wellness[6] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. and Reading | 3 |
| MA 231 Analytical Geom. Calculus II | 3 |
| MEA 102 Geology II: Historical | 3 |
| MEA 111 Geology II Lab | 1 |
| PE 253 Orienteering | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| CH 107 Prin. of Chemistry | 3 |
| CH 127 Prin. of Chemistry Lab | 1 |
| SSC 200 Soil Science | 4 |
| Intro. Economics[1] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE (EC) 336 Intro. Res. & Environ. Economics | 3 |
| BO 200 Plant Life | 4 |
| MEA 410 Intro. Geologic Materials | 4 |
| ST 311 Intro. to Statistics | 3 |
| Free Elective | 3 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MEA 130/135 Intro. Weather & Climate | 4 |
| PY 211 College Physics I | 4 |
| Intro. Political Science[3] | 3 |
| Phil.,Relig.,Vis/Perf.Arts Elective | 3 |
| Technical Writing[2] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| COM 110 Public Speaking | 3 |
| MEA 415 Geology Economics Deposits | 3 |
| MEA 451 Structural Geology | 4 |
| MEA 481 Prin. Geomorphology | 3 |
| PS 336 Global Environ Politics | 3 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BO 360 Intro. Ecology | 3 |
| BO 365 Ecology Lab | 1 |
| MEA 200 Intro. Oceanography | 3 |
| MEA 417 Geol. Fossil Fuel Deposit | 3 |
| History/Literature Elective | 3 |
| Physical Education Elective | 1 |
| | 14 |

| *Spring Semester* | *Credits* |
|---|---|
| NR 400 Mgmt. Natural Res. | 4 |
| SSC 361 Role Soils Environ. Mgmt. | 4 |
| Applied Geology Elective[4] | 3 |
| History/Literature Elective | 3 |
| Physical Education Elective | 1 |
| | 15 |

Minimum Hours Required for Graduation ..... 122[5,6]

[1]EC 201 or ARE 201.
[2]ENG 331, 332, or 333.
[3]PS 201 or PS 202.
[4]MEA 461, 465, 471, or 565 recommended.
[5]All students must demonstrate foreign language proficiency [or complete FL_ 102].
[6]First two PE credits do not count toward minimum credit hours required for graduation.

# CURRICULUM IN NATURAL RESOURCES
# MARINE & COASTAL RESOURCES CONCENTRATION
# (See Interdisciplinary Programs)
# Degree earned: B.S. in Natural Resources

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CFR 134 Computers in Natural Res. | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 131 (or 141) Analytical Geom. & Calculus I | 4 |
| MEA 101 Geology I: Physical | 3 |
| MEA 110 Geology I Lab | 1 |
| NR 100 Intro. to Natural Res. | 2 |
| Any 100-level PE in Fitness & Wellness [4] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| BIO125 General Biology | 4 |
| ENG 112 Comp. & Reading | 3 |
| MA 231 (or 241) Analytical Geom. & Calculus II | 3 |
| MEA 130 Intro. to Weather & Climate | 3 |
| MEA 135 Intro. to Weather & Climate Lab | 1 |
| MEA Option[1] | 3 |
| | 17 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry Lab | 1 |
| MEA 200 Intro. to Oceanography | 3 |
| MEA 210 Intro. Ocean Lab | 1 |
| PE 253 Orienteering[4] | 1 |
| ZO 201 General Zoology | 4 |
| Political Science[2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 Prin. of Chemistry Lab | 1 |
| EC 201 Microeconomics | 3 |
| MEA 220 Marine Biology | 3 |
| MEA 250 Intro. Coastal Environ. | 3 |
| MEA 251 Intro. Coastal Environ. Lab | 1 |
| ST 311 Intro. to Statistics | 3 |
| | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ARE (EC) 336 Intro. Res. & Environ. Economics | 3 |
| BO 360 Intro. to Ecology | 3 |
| BO 365 Ecology Lab | 1 |
| PY 211 (or 205) Physics I w/ Lab | 4 |
| Technical Writing[3] | 3 |
| | 14 |

| *Spring Semester* | *Credits* |
|---|---|
| MEA 323 Earth System Chemistry | 3 |
| MEA 469 Ecology of Coastal Res. | 3 |
| PY 212 (or 208) Physics II w/Lab | 4 |
| SSC 200 Soil Science | 4 |
| Physical Education Elective[4] | 1 |
| | 15 |

SUMMER SESSION

MEA 459 Field Investigations of Coastal Processes ..... 5

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| COM 110 Public Speaking | 3 |
| PS 336 Global Environ. Politics | 3 |
| ZO (FW) 420 Fishery Science | 3 |
| History/Literature Elective[5] | 3 |
| Phil.,Relig.,Vis/Perf.Arts Elective | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| History/Literature[5] | 3 |
| MEA 480 Coastal Issues & Sci. Concepts[7] | 3 |
| NR 400 Mgmt. Natural Res. | 4 |
| Humanities/Soc. Sci. Elective[5] | 3 |
| Physical Education Elective[4] | 1 |
| | 14 |

Minimum Hours Required for Graduation ..... 126[4,6]

[1]MEA 102, MEA 140, or MDS 220.
[2]PS 201 or PS 202.
[3]ENG 331, or 332, or 333.
[4]Under the University General Education Requirements (GER), only 2 credits of physical education courses are counted toward the minimum number of credits required for graduation.
[5]These courses must be selected from the approved GER listing for Social Science and Humanities as follows: *6 hours* in History and/or Literature and *3 hours* from Political Science, Government, Sociology, and/or Cultural Geography. At least 3 of the total selection of *9 hours* of Social Science, History, Literature, and Humanities courses must deal with a non-English speaking culture.
[6]Graduation also requires foreign language proficiency at the FL_ 102 level.
[7] New course to be implemented.

## CURRICULUM IN ENVIRONMENTAL SCIENCES
## AIR QUALITY CONCENTRATION (See Interdisciplinary Programs)
## Degree earned: B.S. in Environmental Sciences

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ENG 111 Comp. & Rhetoric[10] | 3 | ENG 112 Comp. & Reading[10] | 3 |
| MA 141 Analytical Geom. & Calculus I[10] | 4 | ES 100 Intro. Environ. Sci. | 3 |
| Any 100-level PE in Fitness & Wellness [12] | 1 | MA 241 Analytical Geom. & Calculus II[10] | 4 |
| History/Literature Elective | 3 | PY 205 Physics for Engr. & Sci. I[10] | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 | History/Literature Elective | 3 |
| Natural Science Elective[1] | 4 | Physical Education Elective | 1 |
| | 18 | | 18 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| BIO 125 General Biology | 4 | MA 341 Applied Diff. Equations I | 3 |
| E 115 Intro. Computing Environ. | 1 | MEA 312 Physical Meteorology | 3 |
| MA 242 Analytical Geom. & Calculus III | 4 | MEA 314 Meteorology Lab II | 1 |
| MEA 311 Physical Climatology | 3 | Biological Science Elective[3] | 4 |
| MEA 313 Meteorology Lab I | 1 | Computer Science Elective[4] | 3 |
| PY 208 Physics for Engr. & Sci. II | 4 | Physical Education Elective | 1 |
| Physical Education Elective | 1 | | 15 |
| | 18 | | |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 101 General Chemistry I[10] | 3 | CH 107 Prin. of Chemistry[10] | 3 |
| CH 121 General Chemistry I Lab[10] | 1 | CH 127 Prin. of Chemistry Lab[10] | 1 |
| MEA 421 Atmospheric Dynamics I[10] | 4 | ENG 333 Comm. for Sci. | 3 |
| ST 301 Statistics Methods I | 3 | MEA 422 Atmospheric Dynamics II | 4 |
| Comm. Elective[5] | 3 | Phil.,Relig.,Vis/Perf.Arts Elective | 3 |
| | 14 | Statistics Elective[6] | 3 |
| | | | 17 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MEA 455 Micrometeorology | 3 |
| Chemistry Elective[7] | 4 |
| Economics Elective[8] | 3 |
| Natural Science Elective[1] | 4 |
| | 14 |

| *Spring Semester* | *Credits* |
|---|---|
| ARE (EC) 336 Resource Environ Economics | 3 |
| ES 400 Environ. Sci. Project[13] | 3 |
| MEA 456 Air Quality | 3 |
| Chemistry Elective[7] | 3 |
| Political Science Elective[9] | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 127[11,12]

[1]Choose one course with a corequisite laboratory from among the following: MEA 101, 110; MEA 200, 210; or BO 360, 365.
[2]This course should be chosen to satisfy the Science, Technology, and Society Requirement.
[3]Either BO 200 or ZO 201.
[4]Choose an Introduction to Programming Course. FORTRAN is recommended.
[5]Either COM 110 or 112.
[6]Either ST 302 or 371.
[7]Choose either CH 331 (4 cr, fall) and CH 211 (3 cr, spring only), or CHE 205 (4 cr, fall) and CHE 225 (3 cr, spring).
[8]Either EC 201 or ARE 201.
[9]Either PS 320 or 336.
[10]Those courses for which a grade of 'D' is not acceptable.
[11]Students must have demonstrated foreign language proficiency at the FL_ 102 level.
[12]First two PE credits do not count toward minimum credit hours required for graduation.
[13] New course to be implemented.

## CURRICULUM IN ENVIRONMENTAL SCIENCES
## ENVIRONMENTAL GEOLOGY CONCENTRATION
## (See Interdisciplinary Programs)
## Degree earned: B.S. in Environmental Sciences

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 111 Comp. and Rhetoric | 3 |
| MA 141 Analytical Geom. & Calculus I | 4 |
| Any 100-level PE in Fitness & Wellness[12] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 Prin. of Chemistry II | 3 |
| CH 127 Prin. of Chemistry Lab | 1 |
| E 115 Intro. Computing Environ. | 1 |
| ENG 112 Comp. and Reading | 3 |
| ES 100 Intro. to Environ. Science | 3 |
| MA 241 Analytical Geom. & Calculus II | 4 |
| Physical Education Elective | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MA 242 Analytical Geom. & Calculus III | 4 |
| MEA 101 Geology I | 3 |
| MEA 110 Geology I Lab | 1 |
| PY 205 Physics for Engr. & Sci. I | 4 |
| History/Literature Elective | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| MEA 200 Intro. to Oceanography | 3 |
| MEA 210 Intro. to Oceanography Lab | 1 |
| MEA 410 Intro. to Geol. Materials | 4 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| Comm./Speech List Elective | 3 |
| Physical Education Elective | 1 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 333 Comm. for Sci. and Researchers. | 3 |
| MEA 300 Environ. Geology | 3 |
| ST 3_ _ Any 300-level ST course | 3 |
| ZO 201 or BO 200 Biology Option | 4 |
| Economics List Elective[2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| EC (ARE) 336 Intro. Res. & Environ. Economics[3] | 3 |
| MEA 451 Structural Geology | 4 |
| Environ. Policy Option[4] | 3 |
| First Geologic Option[5] | 3 |
| Math/Statistics Option[6] | 3 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MEA 481 Prin. of Geomorphology | 3 |
| SSC 200 Soil Science | 4 |
| Second Geology Option[7] | 3 |
| Humanities/Soc. Sci. Elective[1,8] | 3 |
| Supporting Technical Elective[9] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ES 400 Environ. Science Project[13] | 3 |
| MEA 461 Engineering Geology | 3 |
| History/Literature Elective[1] | 3 |
| Natural Science Option[10] | 3 |
| Phil.,Relig.,Vis/Perf.Arts Elective | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 125[11,12]

[1]GER requires 6 hours from approved Literature and History Lists, plus 3 hours from Phil., Religion or Fine Arts List; at least one of these courses must also be from Non-English Speaking Cultures List.
[2]Option should satisfy prerequisite for EC 336.
[3]Also satisfies Science, Technology & Society requirement.
[4]Option of either PS 320 or PS 336.
[5]Option of any additional 300 or 400 level geology course or SSC 452.
[6]Option of either ST 302, MA 305, MA 341, or MA 405 (may substitute CH 220 for geochemistry focus).
[7]Option of any additional 400 or 500 level MEAcourse.
[8]Recommend an Environmental Ethics Course (e.g. PHI 322, MDS 201).
[9]Recommended selection from the following: (Advanced Soils) SSC 452, SSC 553; (Advanced Chemistry) CH 220, CH 331; (Data Management) ST 430, ST 505; (Land Surface Characterization) GC 200, GC 320, FOR 353, CE 507, PRT 562; (Other) MEA 311, FOR 401, FOR 472, LAR 430.
[10]Option of either MEA 130 or FOR 252.
[11]Students must have demonstrated foreign language proficiency at the FL_ 102 level.
[12]First two PE credits do not count toward minimum credit hours required for graduation.
[13] New course to be implemented.

## MARINE SCIENCES CONCENTRATIONS IN PHYSICS

(See B.S. in Physics)

## MARINE SCIENCES CONCENTRATIONS IN CHEMISTRY

(See B.S. in Chemistry)

# DEPARTMENT OF MATHEMATICS

Harrelson Hall, Room 360

R. H. Martin Jr., *Head*

D. E. Garoutte, *Associate Head and Director of Undergraduate Instruction*

R. T. Ramsay, *Director of Undergraduate Programs and Coordinator of Advising*

H. J. Charlton, *Scheduling Officer and Director of Summer School*

*Alumni Distinguished Undergraduate Professor:* J. M. A. Danby; *Professors:* H. T. Banks, J. W. Bishir, E. E. Burniston, S. L. Campbell, R. E. Chandler, M. T. Chu, E. N. Chukwu, L. O. Chung, J. D. Cohen, J. C. Dunn, A. Fauntleroy, R. O. Fulp, R. E. Hartwig, C. T. Kelley, K. Koh, J. R. Kolb, J. Luh, J. A. Marlin, L. B. Martin, R. H. Martin, C. D. Meyer, C. V. Pao, E. L. Peterson, M. S. Putcha, S. Schecter, J. F. Selgrade, M. Shearer, C. E. Siewert, J. W. Silverstein, M. F. Singer, E. L. Stitzinger, R. E. White; *Adjunct Professor:* R. J. Plemmons; *Professors Emeriti:* J. Levine, N. J. Rose; *Associate Professors:* G. D. Faulkner, B. Fitzpatrick, J. E. Franke, D. E. Garoutte, A. Helminck, I. Ipsen, K. Ito, A. Kheyfets, T. J. Lada, D. M. Latch, X.-B. Lin, K. Misra, L. K. Norris, L. B. Page, R. T. Ramsay, J. Rodriguez, F. H. H. Semazzi, R. Silber, H. T. Tran, D. F. Ullrich, W. M. Waters; *Assistant Professors:* H. J. Charlton, J. Garaizar, D. J. Hansen, P. Hitczenko, W. R. McKinney, S. O. Paur, J. S. Scroggs; *Lecturer:* M. S. McCollum

The undergraduate major in mathematics provides a core of basic mathematics courses along with flexible choices of electives which permit both a well-rounded education and preparation for math-related careers. Because of the current employment market (for both baccalaureate and graduate students), students are advised to give serious consideration to the applied mathematics option.

Career objectives can be directed toward employment in math-related jobs in business industry or government, teaching at the secondary school level, or graduate study in mathematics and/or related areas.

The Mathematics Department operates a Multi-Media Center which incorporates an Audio Visual Center, Tutorial Room, Undergraduate Mathematics Computer Lab and an IBM Computer Classroom. Using video systems, students can access a lecture which was missed or can see a lecture again for emphasis or clarification. Teaching assistants of the Mathematics Department are also available in the center for tutoring services. The computer lab contains Sun Sparc and IBM Risc 6000 workstations which students use with MAPLE, a computer algebra system. The IBM Computer Classroom contains twenty IBM computers networked on Token Ring.

At this time, the center has video tapes of most of our basic courses, including MA 103, MA 105, MA 111, MA 114, MA 121, MA 131, MA 141, MA 231, MA 241, MA

242 and MA 301. The Director of the center is Dr. L. B. Page. The center supervisor is Denise Seabrooks. The center is open seventy-one hours per week and is located in Harrelson Hall.

## HONORS AND AWARDS

The department recognizes its superior students with the following annual awards:

*Hubert V. and Mary Alice Park Scholarship*—An award made to an outstanding rising junior or senior in mathematics.

*John W. Cell Scholarships*—An award for an outstanding rising junior or senior in mathematics.

*Carey Mumford Scholarship*—An award to an outstanding sophomore, junior or senior in mathematics.

*Levine-Anderson Award*—An award for that student who has the best performance in the William Lowell Putnam Examination. (This award is not restricted to mathematics majors).

*Charles N. Anderson Scholarship*—An award for an outstanding sophomore in mathematics.

*Charles F. Lewis Scholarship*—An award for an outstanding senior who is a double major in mathematics/mathematics education.

*Mrs. Roberts C. Bullock Scholarship*—An award for an outstanding mathematics major who has also demonstrated an interest in the English language.

*Howard A. Petrea Scholarship*—An award for an outstanding junior or senior in mathematics.

The department also has a chapter of the National Mathematical Honorary Fraternity Pi Mu Epsilon. Membership is open to those students with superior performance in mathematics courses. Professor Robert Silber is currently the faculty advisor.

## MATHEMATICS HONORS PROGRAM

The Honors Program in Mathematics is designed to encourage undergraduate math majors to pursue a program that will challenge their abilities and better prepare them for their post-graduate careers.

To be admitted to the program a student must have a minimum of 3.500 GPA both overall and in mathematics, as well as the recommendation of the Mathematics faculty. The student is required to complete a minimum of three 500-level courses in mathematics. In addition, the student is expected to complete an independent study of research project, although exceptions to this requirement may be made for

students pursuing a second major. Interested students may contact the Honor Advisor in the mathematics department for more detailed information.

## CURRICULUM IN MATHEMATICS
## Degree earned: B.S. in Mathematics

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 101, CH 121 General Chemistry I | 4 | CSC 110, CSC 112 or CSC 114 | 3 |
| ENG 111 Comp. and Rhetoric | 3 | ENG 112 Comp. and Reading | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 | MA 241 Analytic Geom. & Calculus II | 4 |
| History Elective | 3 | Sci./Math-Related Elective | 3 |
| Any 100-level PE in Fitness & Wellness[1] | 1 | Social Science Elective[2] | 3 |
| | 15 | Physical Education Elective[1] | 1 |
| | | | 17 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| MA 225 Structure of the Real Numbers | 3 | MA 341 or MA 351 | 3 |
| MA 242 Analytic Geom. & Calculus III | 4 | MA 407 Intro. to Modern Algebra | 3 |
| PY 205 Physics for Scientists I | 4 | PY 208 Physics for Scientists II | 4 |
| Literature Elective | 3 | Phil.,Relig.,Vis/Perf.Arts Elective | 3 |
| Physical Education Elective | 1 | Sci./Math-Related Elective | 3 |
| | 15 | Physical Education Elective | 1 |
| | | | 17 |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| MA 405 Intro. to Linear Algebra | 3 | MA 426 Mathematical Analysis II | 3 |
| MA 425 Mathematical Analysis I | 3 | Math. Elective | 3 |
| Sci./Math-Related Elective | 3 | Sci./Math-Related Elective | 3 |
| Social Science Elective[2] | 3 | Writing/Speaking Elective | 3 |
| Free Elective | 3 | Free Elective | 3 |
| | 15 | | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| Math. Elective | 3 | MA 421[3] Intro. to Probability | 3 |
| Math. Elective | 3 | Humanities/Soc. Sci. Electives | 6 |
| Sci., Technology & Soc. Elective | 3 | Math. Elective | 3 |
| Free Electives | 6 | Free Elective | 3 |
| | 15 | | 15 |

Minimum Hours Required for Graduation ..... 122[4,5,6]

[1]First two PE credits do not count toward minimum credit hours required for graduation.
[2]Chosen from two different content areas on the approved list of courses.
[3]ST 371 & ST 372 are an alternative to MA 421. If ST 371 & ST 372 are chosen. ST 372 is counted as one of the Science or Math-Related electives.

[4]One mathematics course and one other course must be chosen from the list of courses which include a major written paper during the junior and senior years. One elective course must have a focus on a non-English-speaking culture.
[5]Grades of D are not accepted in any required mathematics course numbered below 400 and only one D grade is permitted in mathematics courses numbered 400 or above. D grades are not acceptable in ENG 111 and ENG 112. At most one D grade is acceptable among the following: CH 101, CSC 110, CSC 112, CSC 114, PY 205, PY 208, MA 421 (or ST 371).
[6]Students must have demonstrated foreign language proficiency at the FL_ 102 level.

## CURRICULUM IN MATHEMATICS, APPLIED OPTION
## Degree earned: B.S. in Mathematics

### FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 101, CH 121 General Chemistry I | 4 | CSC 110, CSC 112 or CSC 114 | 3 |
| ENG 111 Comp. and Rhetoric | 3 | ENG 112 Comp. and Reading | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 | MA 241 Analytic Geom. & Calculus II | 4 |
| History Elective | 3 | Phil.,Relig.,Vis/Perf.Arts Elective | 3 |
| Any 100-level PE in Fitness & Wellness[1] | 1 | Social Science Elective[2] | 3 |
| | 15 | Physical Education Elective[1] | 1 |
| | | | 17 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| MA 225 Structure of the Real Numbers | 3 | MA 341 or MA 351 | 3 |
| MA 242 Analytic Geom. & Calculus III | 4 | MA 407 Intro. to Modern Algebra | 3 |
| PY 205 Physics for Scientists I | 4 | PY 208 Physics for Scientists II | 4 |
| ST 371[3] Intro. to Probability | 3 | ST 372[3] Intro. to Statistics | 3 |
| Physical Education Elective | 1 | Literature Elective | 3 |
| | 15 | Physical Education Elective | 1 |
| | | | 17 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| MA 405 Intro. to Linear Algebra | 3 | MA 426 Mathematical Analysis II | 3 |
| MA 425 Mathematical Analysis I | 3 | MA 430 or MA 432 Mathematical Models | 3 |
| Applied Elective | 3 | Applied Elective | 3 |
| Social Science Elective[2] | 3 | Writing/Speaking Elective | 3 |
| Free Elective | 3 | Free Elective | 3 |
| | 15 | | 15 |

### SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| Applied Elective | 3 | Applied Elective | 3 |
| Math. Elective | 3 | Humanities/Soc.Sci. Electives | 6 |
| Sci., Technology and Soc. Elective | 3 | Math. Elective | 3 |
| Free Electives | 6 | Free Elective | 3 |
| | 15 | | 15 |

Minimum Hours Required for Graduation ..... 122[4,5,6]

[1]First two PE credits do not count toward minimum credit hours required for graduation.

[2]Chosen from two different content areas on the approved list of courses.
[3]MA 421 is an alternative to ST 371 & ST 372. If MA 421 is chosen, ST 372 is replaced by a Science or Math-Related elective.
[4]One mathematics course and one other course must be chosen from the list of courses which include a major written paper during the junior and senior years. One elective course must have a focus on a non-English-speaking culture.
[5]Grades of D are not accepted in any required mathematics course numbered below 400 and only one D grade is permitted in mathematics courses numbered 400 or above. D grades are not acceptable in ENG 111 and ENG 112. At most one D grade is acceptable among the following: CH 101, CSC 110, CSC 112, CSC 114, PY 205, PY 208, MA 421 (or ST 371).
[6]Students must have demonstrated foreign language proficiency at the FL_ 102 level.

### MINOR IN MATHEMATICS

The Department of Mathematics offers a minor in mathematics to majors in any field except mathematics. The minor program consists of successful completion with a grade of C or better of any five three-semester-hour courses selected from among MA 225, or MA 222, but not both, and any mathematics courses numbered 300 or above.

## DEPARTMENT OF PHYSICS

Cox Hall, Room 105

C. R. Gould, *Head*

D. R. Tilley, *Coordinator of Advising*

*University Professor*: G. Lucovsky; *Alumni Distinguished Graduate Professor:* G. E. Mitchell; *Alumni Distinguished Undergraduate Professors*: C. R. Gould, D. G. Haase. R. R. Patty; *Professors*: D. E. Aspnes, J. Bernholc, K. T. Chung, S. R. Cotanch, D. C. Ellison, R. E. Fornes, C. R. Gould, D. G. Haase, C. E. Johnson, K. L. Johnston, G. H. Katzin, F. Lado Jr., G. Lucovsky, J. D. Memory, G. E. Mitchell, J. R. Mowat, R. J. Nemanich, M. A. Paesler, J. Y. Park, S. P. Reynolds, J. S. Risley, D. E. Sayers, J. F. Schetzina, P. J. Stiles, D. R. Tilley; *Adjunct Professors*: G. J. Iafrate, R. V. Janssens, J. E. Rowe, M. A. Stroscio, J. F. Wilkerson; *Professors Emeriti*: W. R. Davis, W. O. Doggett, G. L. Hall, A. W. Jenkins, E. R. Manring, R. R. Patty, L. W. Seagondollar; *Associate Professors*: G. C. Cobb, J. W. Cook, C. R. Ji, M. A. Klenin, G. W. Parker; *Adjunct Associate Professors*: P. Bogvslawski, J. F. Shriner Jr., A. S. Schlachter; *Associate Professor Emeritus*: D. H. Martin; *Assistant Professors*: H. Ade, R. J. Beichner, J. M. Blondin, H. O. Hallen, E. F. Moore, C. M. Roland, E. S. Swanson; *Assistant Professor Emeritus*: H. L. Owen; *Adjunct Assistant Professors*: G. E. Bulman, L. S. Plano, J. W. Spence; *Associate Members of the Department:* J. M. A. Danby (Mathematics), R. M. Kolbas (ECE), L. K. Norris (Mathematics), D. L. Ridgeway (Statistics), E. C. Theil (Biochemistry).

Physics is the fundamental science of observation, measurement and description of the natural world. Physicists seek to establish a mathematical description of all physical phenomena, ranging from the interactions of quarks in nuclei to the collisions of galaxies in the Universe. Together with scientists in engineering and other physical, biological, and mathematical sciences, physicists collaborate to develop new materials and new insights in all areas of modern science and technology.

## CURRICULA

The Physics undergraduate curriculum provides a strong background in the fundamentals, and provides course options which allow deeper study in areas of selected interest. Undergraduates have the opportunity to work in research laboratories with faculty in the following research areas: astrophysics, atomic physics, physics education, marine physics, nuclear and particle physics, synchrotron radiation, near-field optics, materials physics, solid-state and condensed-matter physics. Undergraduates are frequently co-authors on scientific papers. Physics majors are part of a close-knit community - a small, highly motivated group of people who have wide-ranging interests and a passion for solving problems.

The Bachelor of Science in Physics degree is broad based, and students can go on to technical careers at the bachelors level, or go to graduate school in Physics or other fields. The marine-sciences concentration introduces students to the dynamics of ocean circulation systems, and provides an excellent preparation for either graduate student or entry-level positions in government agencies or industry.

A concentration in Materials Science is available within the B.S. in Physics program. This concentration introduces students to Materials Science and provides and excellent preparation for either graduate study or entry level positions in industry. The program emphasizes a fundamental broad-based knowledge of materials and materials physics.

## PHYSICS HONORS PROGRAM

The Physics Department Honors Program offers students the opportunity to develop their academic potential by increased involvement and participation in physics study and research. A minimum GPA of 3.500 in physics courses and minimum overall GPA of 3.000 is required for initial admission. Students in the program complete a minimum of 12 credit hours, drawn from two of the following three categories: PY 441-Spacetime Physics, PY 400-Independent Research (six hours maximum), PY5xx-any 500-level physics course except PY 525.

# CURRICULA IN PHYSICS
## Degree earned: B.S. in Physics

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| PY 201General Physics [1] | 4 |
| PMS 100 Perspectives on Learning | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 202 General Physics [1] | 4 |
| Physical Education Elective[2] | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| PY 203 General Physics[3] | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| MA 341 Applied Diff. Equations I | 3 |
| PY 413 Thermal Physics | 3 |
| ST 380 Prob. and Stat. for the Physical Sciences | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Free Elective | 3 |
| | 15 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MA 401 Applied Diff. Equations II | 3 |
| PY 411 Mechanics I | 3 |
| PY 414 Electromagnetism I | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Free Elective | 3 |
| Physical Education Elective[2] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 333 Science Writing[4] | 3 |
| PY 412 Mechanics II | 3 |
| PY 415 Electromagnetism II | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Free Elective | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| PY 401 Quantum Physics I | 3 |
| PY 452 Advanced Physics Lab | 3 |
| Computing/Num. Methods | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Technical Elective[2] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| PY 402 Quantum Physics II | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Technical Elective[2] | 3 |
| Technical Elective[2] | 3 |
| Technical Elective[2] | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 122

[1]Students may substitute PY 205 for PY 201, PY 208 for PY 202, and PY 407 for PY 203. However, they must take the lab section of PY 203 if they elect to take PY 407.

[2]The General Education requirement consists of seven courses (21 hrs) chosen as follows: two courses in history/literature, one course in philosophy, religion or the arts; two courses in psychology, economics, politics, sociology, anthropology or cultural geography; and two courses in any humanities/social sciences discipline. One of the courses must focus on a non-English speaking culture.

One of the courses must focus on science, technology and society. Foreign language proficiency at the FL 102 level is required for graduation.

[3] One of the PE courses must be at the 100 level in Fitness and Wellness. The first two PE credits do not count toward minimum credits for graduation. PE may be taken for credit-only (S/U) grading.

[4]Students may substitute any Advanced Writing Course on the GER list for ENG 333.

[5]Technical electives are courses at the 300 level or above in physical, mathematical,and biological sciences, and in engineering.

## CURRICULUM IN PHYSICS, MARINE SCIENCES CONCENTRATION
## Degree earned: B.S. in Physics

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| PY 201General Physics [1] | 4 |
| PMS 100 Perspectives on Learning | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 202 General Physics [1] | 4 |
| Physical Education Elective[3] | 1 |
| | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| MEA 200 Intro. to Oceanography | 1 |
| MEA 210 Intro. to Oceanography Lab | 3 |
| PY 203 General Physics[2] | 4 |
| Physical Education Elective[1] | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CSC 112 Intro. to FORTRAN Programming | 3 |
| E 115 Computer Orientation | 1 |
| MA 341 Applied Diff. Equations I | 3 |
| PY 413 Thermal Physics | 3 |
| ST 380 Prob. and Stat. for the Physical Sciences | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MA 401 Applied Diff. Equations | 3 |
| MEA 311 Physical Climatology | 3 |
| MEA 460 Intro. Physical Ocean | 3 |
| PY 411 Mechanics I | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 333 Science Writing[4] | 3 |
| MEA 462 Observation Meth & Data Analysis | 3 |
| PY 412 Mechanics II | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MEA 473 Prin. of Chemistry of Oceans | 3 |
| MEA/PY 463 Fluid Physics | 3 |
| PY 414 Electricity & Magnetism I | 3 |
| PY 401 or Technical Elective[5] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| MEA 464 Ocean Circulation Systems | 3 |
| MEA 467 Marine Meteorology | 3 |
| PY 402 or Technical Elective[5] | 3 |
| PY 415 Electromagnetism II | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 124

[1]Students may substitute PY 205 for PY 201, PY 208 for PY 202, and PY 407 for PY 203. However, they must take the lab section of PY 203 if they elect to take PY 407.

[2]The General Education requirement consists of seven courses (21 hrs) chosen as follows: two courses in history/literature, one course in philosophy, religion or the arts; two courses in psychology, economics, politics, sociology, anthropology or cultural geography; and two courses in any humanities/social sciences discipline. One of the courses must focus on a non-English speaking culture. One of the courses must focus on science, technology and society. Foreign language proficiency at the FL 102 level is required for graduation.

[3] One of the PE courses must be at the 100 level in Fitness and Wellness. The first two PE credits do not count toward minimum credits for graduation. PE may be taken for credit-only (S/U) grading.

[4]Students may substitute any Advanced Writing Course on the GER list for ENG 333.

[5]Technical electives are courses at the 300 level or above in physical, mathematical,and biological sciences, and in engineering.

## CURRICULUM IN PHYSICS
## MATERIAL SCIENCES CONCENTRATION
## Degree earned: B.S. in Physics

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| E 115 Intro. to Computing Environ. | 1 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| PMS 100 Perspectives on Learning | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 General Chemistry II | 3 |
| CH 127 General Chemistry II Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| PY 201 General Physics I[3] | 4 |
| Physical Education Elective[1] | 1 |
| | 16 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CSC 112/114 Intro. FORTRAN/C++ | 3 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| MAT 201 Struc. & Prop. Engr. Materials | 3 |
| PY 202 General Physics[3] | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| MA 341 Applied Diff. Equations I | 3 |
| MAT 210 Expr. in Materials Engr. | 2 |
| MAT 301 Equil and Rate Processes | 3 |
| PY 203 General Physics[3] | 4 |
| ST 380 Prob. and Stat. for the Physical Sciences | 3 |
| Physical Education Elective[2] | 1 |
| | 16 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MAT 310 Computer Usage in Materials | 2 |
| MAT 330 Crystal Chemistry & Phase Equil | 3 |
| PY 411 Mechanics I | 3 |
| PY 414 Electromagnetism I | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[2] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 333 Science Writing[4] | 3 |
| MAT 321 Phase Transf. & Diffusion | 3 |
| PY 415 Electromagnetism II | 3 |
| Restricted Elective[5] | 3 |
| Humanities/Soc. Sci. Elective[1] | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| PY 401 Modern & Quantum Physics I | 3 |
| Restricted Elective[5] | 3 |
| Restricted Elective[5] | 3 |
| Humanities/Soc. Sci. Elective[1] | 3 |
| Humanities/Soc. Sci. Elective[1] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| MAT 331 Electronic Properties of Materials | 3 |
| PY 402 Modern & Quantum Phys. II | 3 |
| Restricted Elective[5] | 3 |
| Restricted Elective[5] | 3 |
| Humanities/Soc. Sci. Elective[1] | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 124

[1]The General Education requirement consists of seven courses (21 hrs) chosen as follows: two courses in history/literature, one course in philosophy, religion or the arts; two courses in psychology, economics, politics, sociology, anthropology or cultural geography; and two courses in any humanities/social sciences discipline. One of the courses must focus on a non-English speaking culture. One of the courses must focus on science, technology and society. Foreign language proficiency at the FL 102 level is required for graduation.

[2] One of the PE courses must be at the 100 level in Fitness and Wellness. The first two PE credits do not count toward minimum credits for graduation. PE may be taken for credit-only (S/U) grading.

[3] Students may substitute PY 205 for PY 201, PY 208 for PY 202, and PY 407 for PY 203. However, they must take the lab section of PY 203 if they elect to take PY 407.

[4]Students may substitute any Advanced Writing Course on the GER list for ENG 333.

[5] Restricted electives are PY or MAT courses at the 300 level or higher. Students must choose either PY 452 or MAT 424.

## MINOR IN PHYSICS

The Physics Department offers a minor in physics to majors in any field except physics. To complete the minor 17 hours of specified physics courses are required, consisting of PY 205, 208, 407 (or 201, 202, 203) and two of PY 228, 411, 412, 413, 414, 415, 441.

# DEPARTMENT OF STATISTICS

Cox Hall, Room 110

T. M. Gerig, *Head*

S. G. Pantula, *Director of Graduate Programs for Statistics*

K. H. Pollock, *Director of Biomathematics Graduate Program*

B. J. Stines, *Undergraduate Administrator*

*William Neal Reynolds Professor* B. S. Weir; *Alumni Distinguished Graduate Professor* B. B. Bhattacharyya; *Professors:* R. L. Berger, P. Bloomfield, D. D. Boos, C. Brownie, D. A. Dickey, E. J. Dietz, S. P. Ellner, T. M. Gerig, F. Giesbrecht, T. Johnson, J. F. Monahan, D. W. Nychka, S. G. Pantula, K. H. Pollock, D. L. Ridgeway, D. L. Solomon, L. A. Stefanski, W. H. Swallow, J. L. Wasik; *Adjunct Professors:* J. R. Chromy, J. H. Goodnight, P. D. Haaland, N. Kaplan; *Professors Emeriti:* H. J. Gold, A. H. E. Grandage, R. J. Hader, D. W. Hayne, D. D. Mason, R. J. Monroe, L. A. Nelson, C. H. Proctor, C. P. Quesenberry, J. O. Rawlings, J. A. Rigney, R. G. D. Steel, H. R. van der Vaart, O. Wesler; *Associate Professors:* M. Davidian, M. L. Gumpertz, J.

C. Lu, T. W. Reiland, C. E. Smith; *Research Associate Professor:* S. B. Zeng; *Associate Professor Emeritus:* A. C. Linnerud; *Assistant Professors:* S. K. Ghosh, J. M. Hughes-Oliver, T. B. Kepler, J. L. Thorne, W. A. Wang; *Adjunct Assistant Professor:* M. A. O'Connell; *Assistant Professor Emeritus:* B. J. Stines; *Senior Statistician:* S. B. Donaghy; *Research Assistant Statisticians:* C. J. Basten, J. M. Bay; *Teaching Laboratory Supervisor:* J. T. Arnold; *Associate Members of the Statistics Faculty:* W. R. Atchley (Genetics), T. H. Emigh (Genetics), M. M. Goodman (Crop Science), A. R. Hall (Economics), M. W. Suh (Textiles); *Associate Members of the Biomathematics Faculty:* H. T. Banks (Mathematics), J. W. Bishir (Mathematics), B. G. Fitzpatrick (Mathematics), J. F. Gilliam (Zoology), M. J. Groom (Zoology), G. R. Hess (Forestry), T. Johnson (Economics), D. W. Nychka (Statistics), H. E. Schaffer (Genetics), J. F. Selgrade (Mathematics), R. E. Stinner (Entomology), H. T. Tran (Mathematics), G. G. Wilkerson (Crop Science); *Adjunct Professors of Biomathematics:* L. B. Crowder, P. H. Morgan; *Adjunct Associate Professor of Biomathematics:* T. K. Pierson; *Adjunct Assistant Professors of Biomathematics:* P. Dixon, J. S. Kimbell, M. M. Lutz.

Statistics is the body of scientific methodology which deals with the logic of experiment and survey design, the efficient collection and presentation of quantitative information, and the formulation of valid and reliable inferences from sample data. The computer is used as a research tool by the statistician to perform the tasks of management and analysis of data collected from experiments and surveys.

The Department of Statistics is part of the Institute of Statistics, which includes Departments of Biostatistics and Statistics at Chapel Hill. The Department of Statistics provides instruction, consultation, and computational services on research projects for other departments of all colleges at North Carolina State University including the Agricultural Research Service. Department staff are engaged in research in statistical theory and methodology. This range of activities furnishes a professional environment for training students in the use of statistical procedures in the physical, biological and social sciences and in industrial research and development.

## OPPORTUNITIES

The importance of sound statistical thinking in the design and analysis of quantitative studies is generally recognized and is reflected in the abundance of job opportunities for statisticians. Industry relies on statistical methods to control the quality of goods in the process of manufacture and to determine the acceptability of goods produced. Statistical procedures based on scientific sampling have become basic tools in such diverse fields as weather forecasting, opinion polling, crop and livestock estimation, and business trend prediction. Because one can improve the efficiency of use of increasingly complex and expensive experiment and survey data, the statistician is in demand wherever quantitative studies are conducted.

## SCHOLARSHIPS AND AWARDS

The Department of Statistics recognizes the importance of superior academic performance through the awarding of scholarships and certificates of merit. Two scholarships are available for the freshman year for the purpose of attracting academically superior students. The North Carolina State University Chapter of Mu Sigma Rho, the national statistics honorary fraternity, accepts as members students who have had superior performance in statistics courses. Also, the outstanding senior statistics student is recognized through the awarding of an engraved plaque.

## STATISTICS HONORS PROGRAM

The Department of Statistics Honors Program allows exceptional undergraduate students to design a program of study that typically includes advanced courses not ordinarily taken by statistics majors and one or two semesters of independent study or research. Students in the program complete a minimum of 9 credit hours in courses drawn from at least two of the following three categories: MA 425, MA 426 or other courses designated as appropriate by the honors advisor, 500-level courses in statistics or mathematics, and 400- or 500-level courses in independent study. Interested students should contact the Honors Advisor in the statistics department for additional information.

## CURRICULA

The undergraduate curriculum provides basic training for a career in statistics or for graduate study and leads to the bachelor of science in statistics. In addition to statistics, the curriculum includes study in mathematics, computer science, and the biological/physical sciences. While fulfilling their major elective requirements, students can either elect a minor or distribute their study across fields exploring the application of statistics in other fields, such as agriculture and life sciences, computer science, economics and business, industrial engineering, and the social sciences. A cooperative work-study option is also available.

The environmental sciences, whether concerned with basic research or monitoring the status of environmental health, are heavily involved in experimental and/or sampling design, collection of data, data analysis and interpretation. Statistics is the science of designing efficient studies for the collection of data to address specific research questions, and the analysis of these data to provide understanding of the nature of the process or population under study. It is important that environmental scientists be aware of the role of statistics in research and be familiar with basic statistical methods in order to properly plan and execute these studies. The Statistics

Concentration will prepare students to perform at the junior statistician level so they can become intimately involved in the research process and in the ideal situation become a full member of the interdisciplinary research team attacking the environmental problem. Successful completion of the Environmental Sciences, Statistics Concentration will also prepare students for graduate study.

## CURRICULUM IN STATISTICS
## Degree earned: B.S. in Statistics

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| E 115 Intro. to Computing Environ. | 1 | CSC 114 Intro. to Computing-C++ | 3 |
| ENG 111 Comp. & Rhetoric | 3 | (or CSC 112) | |
| MA 141 Analytical Geom. & Calculus I | 4 | ENG 112 Comp. & Reading | 3 |
| Any 100-level PE in Fitness & Wellness | 1 | MA 241 Analytical Geom. & Calculus II | 4 |
| ST 101 Statistics by Example | 3 | Science Elective[2] | 4 |
| History/Literature Elective[1] | 3 | Physical Education Elective | 1 |
| | 15 | | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| MA 242 Analytical Geom. & Calculus III | 4 | COM 110 Public Speaking | 3 |
| ST 301 Statistical Methods I | 3 | (or COM 112 or 146 or 211) | |
| Humanities/Soc. Sci. Elective[3] | 3 | MA 225 Foundations of Adv. Math. | 3 |
| Science Elective[2] | 4 | MA 405 Intro. to Linear Algebra & Matrices | 3 |
| Physical Education Elective | 1 | ST 302 Statistical Methods II | 3 |
| | 15 | Humanities/Soc. Sci. Elective[3] | 3 |
| | | Physical Education Elective | 1 |
| | | | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ST 421 Intro. to Mathematical Stat. I | 3 | ST 422 Intro. to Mathematical Stat. II | 3 |
| ST 430 Intro. to Regression Analysis | 3 | ST 431 Intro. to Experimental Design | 3 |
| Humanities/Soc. Sci. Elective[3] | 3 | ST 445 Intro. to Stat. Computing & Data Mgmt. | 3 |
| Major Elective[4] | 3 | Major Elective[4] | 3 |
| Science Elective[2] | 4 | Science Elective[2] | 3 |
| | 16 | | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| ENG 331 Comm. for Engr. & Tech. | 3 | ST 432 Intro. to Survey Sampling | 3 |
| (or ENG 332 or 333) | | Major Elective[4] | 3 |
| ST 435 Stat. Meth. for Qual. & Prod. Improv. | 3 | Major Elective[4] | 3 |
| History/Literature Elective[1] | 3 | Phil.,Relig.,Vis/Perf.Arts Elective | 3 |
| Major Elective[4] | 3 | Statistics Elective[5] | 3 |
| Sci., Technology, & Soc. Elective | 3 | | 15 |
| | 15 | | |

Minimum Hours Required for Graduation ..... 122[6]

Students must have demonstrated foreign language proficiency at the FL_102 level.
At least one of the two History/Literature Electives must focus on a non-English speaking culture.
²Two sequences selected from CH 101/121 - CH 107/127; PY 205-208; BIO 125 and (BO 200 or 213 or 360/365 or ZO 201 or 212 or 220 or 221); MEA 101 with 110 and (MEA 102 or 130 or 200 or 220). At least one year of CH or PY.
³Three courses required coming from at least two of the following lists: Psychology, Economics, Politics and Anthropology, and/or Cultural Geography.
⁴The major elective courses, selected from a list of approved major electives, require the approval of student's advisor.
⁵Statistics elective to be taken from a list of Statistics major elective courses.
⁶Not more than one D grade will be accepted in the required ST, CSC and MA courses, and the major electives (with a grade of C or better required in ST 421).

## MINOR IN STATISTICS

The Department of Statistics offers a minor in statistics to majors in any field except statistics. The minor program consists of the successful completion of ST 301-302, ST 371-372 or ST 421-422, and one other approved Department of Statistics course with a grade of C or better in each course.

## CURRICULUM IN ENVIRONMENTAL SCIENCES
## STATISTICS CONCENTRATION (See Interdisciplinary Programs)
## Degree earned: B.S. in Environmental Sciences

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| E 115 Intro. to Computing Environ. | 1 | CFR 134 Computers in Natural Res. | 1 |
| ENG 111 Comp. and Rhetoric | 3 | CSC 112 Intro. to Computing-Fortran | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 | (or CSC 114) | |
| MEA 101 Geology I: Physical | 3 | ENG 112 Comp. and Reading | 3 |
| MEA 110 Geology I Lab | 1 | ES 100 Intro. to Environ. Sci. | 3 |
| (or MEA 130/135 or MEA 200/210) | | MA 241 Analytic Geom. & Calculus II | 4 |
| History/Literature Elective | 3 | Any 100-level PE in Fitness & Wellness | 1 |
| | 15 | | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 101 General Chemistry I | 3 | ARE 336 Intro. Res. & Environ. Economics | 3 |
| CH 127 General Chemistry I Lab | 1 | CH 107 General Chemistry II | 3 |
| MA 242 Analytic Geom. & Calculus III | 4 | CH 127 General Chemistry II Lab | 1 |
| ST 301 Statistical Methods I | 3 | MA 225 Foundations of Advanced Math. | 3 |
| Economics Elective | 3 | MA 305 Elementary Linear Algebra or | 3 |
| Physical Education Elective | 1 | MA 405 Intro. to Linear Algebra & Matrices | |
| | 15 | ST 302 Statistical Methods II | 3 |
| | | | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BIO 125 General Biology | 4 |
| COM 110 Public Speaking | 3 |
| (or COM 112 or 146 or 211) | |
| PY 205 Physics for Engr. & Sci. I | 4 |
| ST 430 Intro. to Regression Analysis | 3 |
| Physical Education Elective | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| BO 200 Plant Life or ZO 201 Gen. Zoology | 4 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| ST 431 Intro. to Exp. Design | 3 |
| ST 432 Intro. to Sampling Survey | 3 |
| Physical Education Elective | 1 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BO 360 Intro. to Ecology | 3 |
| BO 365 Intro. to Ecology Lab | 1 |
| ENG 331 Comm. for Engr. & Tech. | 3 |
| (or ENG 332 or 333) | |
| PS 320 United States Environ. Politics or | 3 |
| PS 336 Global Environ. Politics | |
| ST 421 Intro. to Math. Stat. I | 3 |
| Humanities/Soc. Sci. Elective | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ES 400 Environ. Sci. Proj. Course[2] | 3 |
| ST 422 Intro. to Math. Stat. II | 3 |
| ST 445 Intro. to Statistical Computing | 3 |
| History/Literature Elective[1] | 3 |
| Phil.,Relig.,Vis/Perf.Arts Elective | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 122

Student must also have demonstrated a foreign language proficiency at the FL_102 level.

[1]At least one of the two History/Literature Electives must focus on a non-English speaking culture.

[2]New course to be implemented.

# COLLEGE OF TEXTILES

*Room 3409, Centennial Campus*
*NCSU Box 8301*
*Raleigh, NC 27695-8301*

*Phone:* *(919) 515-1532*
*Fax:* *(919) 515-8578*
*Internet E-mail:* *tx-admit@tx.ncsu.edu*

R. A. Barnhardt, *Dean*

D. R. Buchanan, *Associate Dean, Extension and Applied Research*

P. L. Grady, *Associate Dean, Special Projects*

C. D. Livengood, *Associate Dean, Academic Programs; Director of Graduate Programs for Fiber and Polymer Science and Textile Technology Management*

P.R. Dail, *Coordinator of Undergraduate Advising*

C. L. Barton, *Assistant to the Dean, Student Services and Placement*

T.M. Langley, *Student Services Manager*

P. L. Garwig, *Librarian, Burlington Textiles Library*

B. Allen, *Coordinator of African-American Students*

For more information contact Dr. C. D. Livengood, Room 3409 at (919)515-6643.

The field of textiles is broad. It covers almost every aspect of our daily lives with applications in medicine, space, recreation and sports, personal safety, environmental improvement and control, transportation, household and apparel uses. These versatile materials, textiles, are made to design specifications by a variety of modern high speed processes, utilizing tools such as lasers, electronics and computers. Textiles begins with the synthesis of fibers by man or by nature. Textiles are carried through many processes for fabric formation, including the steps necessary to make fabrics useful, such as the manufacture of dyestuffs and colorants, chemical auxiliaries and finishes, and cutting and fashioning into end-use products.

The approximately 5,000 graduates of the College of Textiles hold diverse positions, many in North Carolina. In the textile and related industries, occupations range from manufacturing management, sales, and corporate management to designing and styling, research and development, technical service, quality control

and personnel management. These textile graduates are in the creative and management decision-making aspects of the industry. They plan the flow of materials, processes and information. They create new products and processes. They solve product and process problems. They create styles, designs, patterns, colors, textures, and structures for apparel, home and industrial uses. They engineer systems and products required of industrial, space, medical, apparel and other uses of textile products. They deal with computers, automation, product quality, plant performance and environmental problems. They manage large and small companies, personnel, and systems.

The College of Textiles prepares its graduates for careers in these occupations. A broad background is stressed; two-thirds of the course work normally comes from other departments of the university. Opportunities remain excellent, with the college maintaining one of the university's best placement records. Demand for textile graduates from North Carolina State University is particularly strong, due mainly to the strength of the academic programs. These programs are offered by two degree granting departments: Textile and Apparel Technology and Management, and Textile Engineering, Chemistry, and Science.

## CURRICULA

The College of Textiles offers a broad choice of curricula from which to choose. Bachelor of Science programs in Textiles, Textile and Apparel Management, Textile Materials Science, and Textile Chemistry are available. These programs allow students to choose from a wide range of courses in addition to required core courses. A Bachelor of Science in Textile Engineering, offered jointly by the College of Textiles and the College of Engineering, is also available. The textile student's curriculum includes humanities, social sciences and basic sciences and may include concentrations in business, economics, industrial engineering, mathematics, physics, chemistry, computer science or statistics. A variety of dual degree possibilities are open to textile students, usually requiring at least two semesters of additional study.

Since professional textiles study is concentrated in the last two years of the student's program, it is possible for students from junior or community colleges, or other institutions of higher learning, to transfer to the College of Textiles with a minimum loss of time.

****University Physical Education requirements have been modified. It is recommended that students consult with their adviser on specific curriculum requirements regarding PE.*

## FIELD TRIPS

For certain textile courses, it is desirable for the student to see the manufacturing process under actual operating conditions. When possible, student groups visit outstanding manufacturing plants. Trip participation is required. Transportation costs and other travel expenses, while held to a minimum, are paid by the student.

## SUMMER EMPLOYMENT

Job opportunities for summer employment are available for textile students. Placement assistance is available through the college placement office and frequently can be arranged in the student's home community. Qualified students may arrange to receive academic credit through the Summer Intern program.

## DEGREES

Upon completion of programs in either textiles, textile and apparel management, textile materials science, textile chemistry, or textile engineering, the degree of Bachelor of Science is conferred.

The College of Textiles offers the following graduate degrees: Master of Textiles, Master of Science in Textiles, Master of Science in Textile Chemistry, Doctor of Philosophy in Fiber and Polymer Science, and Doctor of Textile Technology and Management. For general requirements, consult the *Graduate Catalog.*

By faculty agreement, candidates for the Doctor of Philosophy degree in other schools of this university may specialize in textile-related subjects. In such cases, research is usually done in textiles.

## ELI WHITNEY DOUBLE DEGREE PROGRAM IN TEXTILE AND APPAREL MANAGEMENT AND INTERNATIONAL STUDIES

The joint program between the College of Textiles and the College of Humanities and Social Sciences allows a student to earn a B.S. degree in Textile and Apparel Management and a B.A. degree in Multidisciplinary Studies with a concentration in International Studies. This dual degree is designed to prepare students for work in the increasingly international textile industry.

The program includes all the technical course requirements associated with the Textile and Apparel Management degree. For the B.A. in Multidisciplinary Studies, students choose from among three areas of concentration: the Pacific Rim (language study in Japanese or Chinese), Latin America (language study in Spanish), or Europe

(language study in German or Italian). The program, which takes four to five years to complete, also includes possible overseas internships.

Merit scholarship awards are available for high-achieving students who participate in the double degree program. For more information, contact the Department of Textile and Apparel Technology and Management, Centennial Campus, Rm. 3245 Textile Complex or the Assistant Dean of Undergraduate Studies, College of Humanities and Social Sciences, 106 Caldwell Hall.

## FOUR-ONE PROGRAM

The College of Textiles has a program which permits a student with a baccalaureate degree from an accredited college or university to complete the requirements for a Bachelor of Science degree in textiles, textile and apparel management, textile materials science or textile chemistry after the satisfactory completion of a minimum of one year of study.

Applicants should have completed basic economics, mathematics, physics and chemistry requirements comparable with those required for the textile degree sought. Under these conditions, the student generally may complete the degree requirements in two summer sessions and two regular semesters. Students not meeting specific requirements in business, economics, sciences, or mathematics should remove deficiencies prior to entering a specific degree program, otherwise the program of study may require three or more semesters.

Each applicant's undergraduate program is considered individually and, in general, a complete transfer of credits is possible.

## HONORS PROGRAM

This program offers exceptional students the opportunity to explore areas of special interest through various forms of research or independent study. Students of high academic level, after their first or second year of study, are invited to participate in this program. Special lectures, discussion groups and seminars in the freshman and sophomore years offer possibilities for future development in the honors program. Additional advising is available and recommended in order to create and define degree programs which meet students' needs. Honors sections and graduate level classes are open to these students. The College of Textiles honor student will conduct a literature review and conduct an honors research project in an area of special interest. The honors project ranges from a scholarly review of a special topic to a discussion of an experimental research problem.

## HONOR SOCIETY

Sigma Tau Sigma is the scholastic textile fraternity which was founded in the College of Textiles in 1929 to honor students who have a grade point average of 3.250 or higher. The main goal of this fraternity is to create a high standard of scholarship among textile students. Twice every year the local chapter selects as its prospective members junior textile students who meet the above criterion. Sigma Tau Sigma also promotes excellence by awarding a trophy to the graduating senior with the highest overall grade point average in the college.

## TEXTILE SCHOLARS-IN-RESIDENCE PROGRAM

This program is sponsored by the College of Textiles and the Division of Student Affairs. It is a four-year program with emphasis on a textile seminar series and educational and cultural enrichment activities. These co-curricular activities include seminars on special topics related to the textile curriculum and profession, tutorial sessions, field trips and musical and drama performances. Students are invited to join this program after their acceptance at NC State based on their predicted performance and must maintain a GPA of 3.000 to continue. All students are housed together with upperclassmen living with freshmen whenever possible.

## ASSOCIATE OF THE TEXTILE INSTITUTE (ATI) DIPLOMA

The Textile Institute with headquarters in Manchester, England is a prestigious international professional textile organization. This organization recognizes graduates from most of the College of Textiles programs who have achieved a GPA of 2.800 or higher. These graduates will be granted full exemption from the ATI examination.

## SCOTTISH COLLEGE OF TEXTILES EXCHANGE PROGRAM

Selected students enrolled in the textile design concentration with junior standing are given the opportunity to spend the spring semester of the junior year at the Scottish College of Textiles while registered for textile design courses at NC State. Tuition and fees are paid at the regular rate to NC State. Travel costs for the selected students will be funded through the Louis Cramer Award in textile design which is administered by the College of Textiles. Each student will be responsible for costs of accommodations, meals and other personal needs.

Similar arrangements are available for students of the Scottish College of Textiles. The total exchange program is limited to 12 credit hours.

## ECOLE SUPERIEURE DES TECHNIQUES INDUSTRIELLES ET DES TEXTILES (ESTIT), LILLE, FRANCE, EXCHANGE PROGRAM

Selected students enrolled in the textile engineering and textile chemistry degree programs are given the opportunity to spend a semester or a year at ESTIT while registered at NC State. Tuition and fees are paid at the regular rate to NC State. Each student is responsible for cost of accommodations, meals and other personal needs.

Similar arrangements are available for students of ESTIT.

## SILVER DESIGN MEDAL OF THE ROYAL SOCIETY OF ARTS, LONDON

The Royal Society of Arts, London has selected North Carolina State University as one of the universities eligible to award its silver medal to one graduate each year. This award is given to a student who demonstrates excellence in the field of textile styling/design and is presented at the May commencement ceremonies.

## SCHOLARSHIPS

The Directors of the North Carolina Textile Foundation and friends of the College of Textiles have established an outstanding freshman scholarship program for textile majors:

*Textile Foundation Merit Awards*—These scholarships are renewable for up to four years of study at $3,500 per year, constituting an overall award of $14,000. A tuition differential may be added to the award for an out-of-state student. Four recipients are chosen every year.

*Charles and Abraham Erlanger Merit Award*—One renewable scholarship for $3,500 per year, for a total award value of $14,000.

*Charles A. Hayes Merit Award*—One renewable scholarship for $3,500 per year, for a total award value of $14,000.

*Lineberger Merit Award*—One renewable scholarship of $3,500 per year, for a total award value of $14,000.

*Textile Freshman Prestige Scholarships*—Up to twenty of these scholarships will be awarded to members of each class. Ranging from $1,000 to $2,000 per year, these scholarships are renewable for up to four years.

## COOPERATIVE EDUCATION PROGRAM

This is a voluntary program which combines academic study with job experience. To be eligible for the program, a student must have completed two semesters at NC State (one semester for transfer students) and have a minimum GPA of 2.250. The

program provides for alternating semesters of full-time study and full-time work. A minimum of three work periods is required to complete the program.

## FACILITIES

The new College of Textiles became a reality in the spring of 1991. The Centennial Campus, which contains the new facility as well as other research and educational facilities, has now grown to approximately 1,000 acres.

The North Carolina General Assembly allocated $27 million to build the College of Textiles facility and an additional $6 million for equipment modernization. The 298,000 square foot facility has been planned by the faculty and staff at the college, in conjunction with a review process for recommendation and improvements from key industry representatives. Space allocation for undergraduate programs is 34 percent, and for graduate and research programs, 31 percent.

The college has developed a Model Manufacturing Facility within the new building that is capable of extruding fiber; spinning, weaving/knitting and finishing fabric; producing nonwovens; and constructing garments. This facility is the only one of its kind in the world dedicated to textile industry/academic sponsorship. One of the first projects to be developed is a total and complete CIM environment within its laboratories.

The College of Textiles on the Centennial Campus is the center for textile education and research in the U.S. Within its walls are a critical mass of students, faculty, facilities, and programs that will "make a difference" for United States fiber, textile, and apparel industries.

## SPECIAL SERVICES

The College of Textiles offers several services and programs which enrich its academic programs.

**Textile and Apparel Research** is conducted on a wide variety of problems relating to the fiber, textile and apparel industries. Frequently, the problems are interdisciplinary and involve team effort. Students have an opportunity to participate in the solution to current problems.

**Textiles Extension and Continuing Education** is vigorously participated in by all faculty. It serves the needs of the textile industry to disseminating research findings and offering short courses for executive, scientific and supervisory personnel. The two-way exchange in these activities keeps students and faculty informed on all of the latest developments.

**The Office of Student Services** is responsible for the placement and financial aid programs of the College of Textiles. The placement office brings together industry recruiters and students for interview sessions for permanent and summer employment. Alumni may also take advantage of the placement office.

The financial aid function is operated by a committee. It is possible for any North Carolina student to pursue an education in textiles through scholarships, loans or grants, as long as he or she maintains the university's academic standards.

### TEXTILE OFF-CAMPUS TELEVISED EDUCATION (TOTE)

TOTE is a special videocassette-based project designed to give any qualified person an opportunity to participate in College of Textiles courses previously only available to on-campus students. Recordings are made in a specially designed studio/classroom at the College of Textiles. Regularly scheduled classes are recorded in such a manner as to retain the normal classroom atmosphere. Lectures are presented in total, candidly and informally.

Single courses are available to any individual seeking an improved textiles education or background (credit or audit). TOTE students off-campus are on a schedule approximately one week behind the university semester calendar. To offer the distance learner maximum course choices, certain pre-recorded courses whose content is current are available. In these cases, the distance learner has the same contact opportunities with the classroom lecturer.

## DEPARTMENT OF TEXTILE AND APPAREL TECHNOLOGY AND MANAGEMENT

College of Textiles, Centennial Campus, Room 3245

T. J. Little, *Head*

W. Oxenham, *Associate Head and Director of Graduate Programs*

*Klopman Distinguished Professor*: S. C. Winchester Jr.,; *Alumni Distinguished Undergraduate Professors*: P. Banks-Lee, M. L. Robinson; *Professors*: R. A. Barnhardt, S. K. Batra, G. A. Berkstresser III, R. A. Donaldson, A. H. El-Shiekh, T. J. Little, W. Oxenham, M. W. Suh; *Visiting Professor*: E. M. McPherson; *Adjunct Professors*: R. W. Dent, M. Gaetan, A. B. Godfrey, W. A. Klopman; *Professors Emeriti*: A. B. Moss, W. C. Stuckey Jr.; *Associate Professors Emeriti*: P. B. Hudson, M. L. Robinson; *Associate Professors*: P. Banks-Lee, H. A. Davis, T. K. Ghosh, G. L. Hodge, T. Lassiter, A. Seyam, G. W. Smith; *Adjunct Associate Professors*: W. Barrie Fraser, C. Pries:land, P. E. Sasser, D. Spanton; *Assistant Professor*: H. H. A. Hergeth; *Assistant Professor Emeritus*: F. W. Massey; *Adjunct Instructor*: D. V. Olsen-Turner; *Instructor*: E. C. Carrere

For more information contact Dr. T. J. Little, Room 3243 at (919)515-6646.

The Department of Textile and Apparel, Technology and Management offers bachelor of science degrees in Textile and Apparel Management and in Textile Technology. Each degree permits the student to specialize in concentrations. The curricula combine a foundation both in textile management and textile technology principles and applications. The B.S. Textile and Apparel Management degree has a Management concentration and an Apparel concentration, while the B.S. Textile Technology degree offers a Textile Design Option.

## CURRICULA

The B.S. in Textile and Apparel Management, together with its concentrations, provides opportunities for the student to get additional background in apparel manufacturing, production factors, law and labor relations, management science, finance and accounting.

The B.S. in Textiles Technology offers the student a background in the technology of fibers, yarns and fabrics and the manufacturing processes involved. The Textile Design option gives a broad foundation in textiles and specializes in the application of design principles to the wide range of textile materials. Students are encouraged to complete a minor in Design.

Opportunities for outstanding undergraduate students are allowed in graduate studies including research sponsored by university funds and industrial and government sponsors.

The Textile and Apparel Management department also administrates the Eli Whitney Scholarship program for students wishing to undertake a study of international business in conjunction with their studies in Textile and Apparel Management. This program permits the student to earn a B.A. degree as offered by the College of Humanities and Social Science and a B.S. degree in Textile and Apparel Management.

# CURRICULUM IN TEXTILE TECHNOLOGY*
## Degree earned: B.S. in Textile Technology

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 131 Analytic Geom. & Calculus A *or* | |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Any 100-level PE in Fitness & Wellness [1] | 1 |
| T 105 Intro. to Text. Materials Sci. | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 Prin. of Chemistry | 3 |
| CH 127 Prin. of Chemistry Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 231 Analytic Geom. & Calculus B *or* | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| TT 220 Yarn Production Systems | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective[1] | 1 |
| | 17-18 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CSC 200 Intro. to Computers & Use | 3 |
| EC 201 Intro. to Economics[1] | 3 |
| PY 205 Physics for Engr. & Sci. I *or* | |
| PY 211 College Physics I | 4 |
| TC 203 Intro. to Polymer Chemistry | 3 |
| TT 250 Text. Fabrics: Form & Structure | 3 |
| Physical Education Elective | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| PY 208 Physics for Engr. & Sci. II *or* | |
| PY 212 College Physics II | 4 |
| ST 361 Intro. to Statistics for Engr. | 3 |
| TMS 211 Intro. to Fiber Sci. | 3 |
| TT 320 Mechanics of Spun Yarn Mfg.Systems | 4 |
| TT 341 Knitting Systems | 3 |
| | 17 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| TAM 330 Text. Meas. & Qual. Control. | 4 |
| TC 301 Technology of Dyeing & Finishing | 4 |
| TT 351 Weaving System | 3 |
| TT 425 Text. Yarn Production & Properties | 3 |
| Humanities/Soc. Sci.. Elective[2] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 332 Comm. for Business & Mgmt. | 3 |
| TAM 380 Mgmt. & Control. Text. Applic. Systems. | 3 |
| Textile Option Elective[3] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective | 1 |
| | 13 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| TMS 460 Physical Properties of Text. Fibers | 3 |
| TT 305 Fiberweb & Nonwoven Production | 3 |
| TAM 495 Senior Seminar | 1 |
| Textile Option Elective[3] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 13 |

| *Spring Semester* | *Credits* |
|---|---|
| TT 370 Technical Fabric Design | 4 |
| Textile Option Elective[3] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 13 |

Minimum Hours Required for Graduation ..... 120

N.B.: Student must satisfy the foreign language requirements of FL_ 102.

[1]The first two Physical Education courses do not count towards the minimum credit for graduation.

[2]Within the Humanities/Social Science electives that have not been specified, the following criteria must be met:

- Two courses (6 CR) must be from the "History Electives" or "Literature Electives" lists.

- One course (3 CR) must be from any of the lists "Psychology Electives," "Politics Electives," or "Cultural Geography Electives" lists.
- One of these courses must be from the lists of "Courses on Non-English Speaking Cultures."
- One of these courses must be from the "Science, Technology, and Society (Humanities and Social Science Perspective)" list.
- Students who intend to select the Textile Design options must include DN 272 as a Humanities and Social Science Elective.

[1]Textile Options for Textile Technology Studies (9-12 credit hours).
Select a total of nine credit hours from one of the following groups or 12 hours in textile design group.

*Apparel Technology*
TAM 218 ..... 3
TAM 315 ..... 3
TAM 316 ..... 3

*Advanced Studies*[**]
MA 242[2] ..... 4
MA 341[2] ..... 3
TAM 490 ..... 3
TAM 520 ..... 3
TAM 555 ..... 3
TES 561 ..... 3

*Textile Design*
TAM 371 ..... 3
TAM 372 ..... 3
DN 470
or TAM 470 ..... 6

*Science*[4]
CH 221[2] ..... 3
CH 223[2] ..... 3
T 401 ..... 3
T 402 ..... 3
TES 500 ..... 3

*Management Science*
ACC 280 ..... 3
TAM 381 ..... 3
TAM 480 ..... 3
TAM 487 ..... 3

*Manufacturing Technology*
TT 420 ..... 3
TT 443 ..... 3
TT 450 ..... 3
TAM 490 ..... 3
IE 352 ..... 3
IE 452 ..... 3

*Quality Technology*
TAM 431 ..... 3
TAM 490 ..... 3
TAM 530 ..... 3
TC 305 ..... 3

[*]Students enrolled in the curriculum for B.S. in Textile Technology who are interested in aspects of design in textiles should consider the minor in Design, which is offered for students in the College of Textiles by the Department of Design and Technology.

[**]Advanced Studies Option: Recommended to students interested in pursuing graduate education. The math track MA 141, 241, 242, and 341 is required. One additional course is chosen from TAM 490, TAM 520, TAM 555, and TES 561.

[2]Required

[4]Science Option. The chemistry track CH 101, 107, 121, 127, 221, 223 is required. One additional course is chosen from TC 401, T 402, and TES 500.

## CURRICULUM IN TEXTILE AND APPAREL MANAGEMENT
## APPAREL MANAGEMENT CONCENTRATION
## Degree earned: B.S. in Textile and Apparel Management

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 101 General Chemistry I | 3 | EC 201 Economics I[2] | 3 |
| CH 121 General Chemistry Lab | 1 | ENG 112 Comp. & Reading | 3 |
| ENG 111 Comp. & Rhetoric | 3 | MA 231 Analytic Geom. & Calculus B *or* | |
| MA 131 Analytic Geom. & Calculus A *or* | | MA 241 Analytic Geom. & Calculus I | (4)3 |
| MA 141 Analytic Geom. & Calculus I | 4 | TAM 218 Intro. to Apparel Technology Mgmt. | 3 |
| Any 100-level PE in Fitness & Wellness[5] | 1 | TT 220 Yarn Production Systems | 3 |
| T 105 Intro. to Text. Materials Sci. | 3 | Physical Education Elective | 1 |
| | 15 | | 16 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ACC 280 Managerial Accounting[1] | 3 |
| EC 301 Intermed. Microeconomics[1] | 3 |
| PY 205 Physics for Engr. & Sci.[1] *or* | |
| PY 211 College Physics I | 4 |
| TC 203 Intro. to Polymer Chemistry | 3 |
| TT 250 Textile Fabrics: Form & Structure | 3 |
| Physical Education Elective | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| BUS/ST 350 Economics. & Bus. Statistics *or* | |
| ST 361 Intro. to Statistics for Engr. | 3 |
| EC 302 Intermed. Macroeconomics | 3 |
| TAM 315 Apparel Production I | 3 |
| TMS 211 Intro. to Fiber Sci. | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective | 1 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BUS 360 Marketing Methods *or* | |
| TAM 382 Princ. of Soft Goods Mktg. | 3 |
| TAM 331 Qual. Control. Text. Production Mgmt. | 3 |
| TAM 380 Mgmt. & Control. Text. Applic. Systems.[3] | 3 |
| COM 146 Bus. & Professional Comm. *or* | |
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 332 Comm. for Business & Mgmt. *or* | |
| ENG 333 Comm. for Sci. & Research | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| BUS 320 Financial Mgmt. | 3 |
| TAM 316 Apparel Production II | 3 |
| TAM 480 Prod. Mgmt. Text. Oper. | 3 |
| TC 301 Technology of Dyeing & Finishing | 4 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| TAM 415 Apparel Product Dev. | 3 |
| TAM 481 Prod. Cost Text. & Applic. | 3 |
| TAM 482 Textile Marketing Mgmt. | 3 |
| TAM 495 Senior Seminar Text. & Applic. | 1 |
| Textile Elective[4] (TAM 431) | 3 |
| Textile Elective[4] (TAM 487) | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| IE 352 Work Analysis & Design *or* | |
| TAM 416 Apparel Production III | 3 |
| TAM 484 Mgmt. Dec. Mak. Text. Firm | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Textile or Mgmt. Elective[4,5] | 3 |
| | 12 |

Minimum Hours Required for Graduation ..... 123

Foreign language proficiency at the FL_ 102 level is required for graduation, either by taking FL_ 102 or by placement out of FL_ 102.

It is strongly suggested to all students to take Free Electives as permitted by their schedule.

A Physics sequence (e.g. PY 205/PY 208 or PY 211/PY 212) is strongly suggested for students who see themselves working in research related areas.

[1]Prerequisite for PY 205 is MA 141 with grade C or better.

[2]Within the Humanities/Social Science electives that have not been specified the following criteria must be met:

- Two courses (6 CR) must be from the "History Electives" or "Literature Electives" lists.
- One course (3 CR) must be from any of the lists "Philosophy Electives," "Religion Electives," "Visual and Performing Arts Electives."
- One course (3 CR) must be from any of the lists "Psychology Electives," "Economics Electives," "Politics and Government Electives," "Sociology Electives," "Anthropology Electives," "Cultural Geography Electives."
- One of these course must be from the lists of "Courses on Non-English Speaking Cultures."
- One of these courses must be from the list "Science, Technology, and Society (Humanities and Social Science Perspective)."

[3]A minimum grade of C is required in EC 201, ACC 280, and TAM 380 for graduation in this concentration. Credit is not allowed for both ACC 280 and the ACC 210/ACC 220 series.

[4]Textile Electives:

A minimum of 6 Credit Hours of Textile Electives (TAM 431 and TAM 487) and 3 Credit Hours of Textile Electives or Management Electives is required towards the degree. Students will select from the following lists:

TT 305, TT 320, TT 341, TT 350, TT 351, TT 370, TT 405, TT 420, TT 425, TT 443, TT 450, TT 451, TAM 383, TAM 431*, TAM 487*, TAM 490 or T 493**, TAM 401.

* Students in the Apparel Management concentration must take TAM 431 and TAM 487 as Textile Electives.

** Credit towards the Textile Electives will only be given for either TAM 490 or T 493.

5 The first two Physical Education courses do not count towards the minimum credit for graduation.

## CURRICULUM IN TEXTILE AND APPAREL MANAGEMENT
## TEXTILE MANAGEMENT CONCENTRATION
## Degree earned: B.S. in Textile and Apparel Management

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry Lab | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 131 Analytic Geom. & Calculus A *or* | |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Any 100-level PE in Fitness & Wellness [6] | 1 |
| T 105 Intro. to Text. Material Sci. | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| EC 201 Economics I[5] | 3 |
| ENG 112 Comp. & Reading | 3 |
| MA 231 Geom. & Calculus B *or* | |
| MA 241 Geom. & Calculus I | (4)3 |
| TAM 218 Intro. to Apparel Technology Mgmt. | 3 |
| TT 220 Yarn Production Systems | 3 |
| Physical Education Elective | 1 |
| | 16-17 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ACC 280 Managerial Accounting[3] | 3 |
| EC 301 Intermed. Microeconomics | 3 |
| PY 205 Physics for Engr. & Sci.[1] *or* | |
| PY 211 College Physics I | 4 |
| TC 203 Intro. to Polymer Chemistry | 3 |
| TT 250 Textile Fabrics: Form & Structure | 3 |
| Physical Education Elective | 1 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| BUS/ST 350 Economics. & Bus. Statistics *or* | |
| ST 361 Intro. to Statistics for Engr. | 3 |
| EC 302 Intermed. Macroeconomics | 3 |
| BUS 320 Financial Mgmt. | 3 |
| TMS 211 Intro. to Fiber Sci. | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Physical Education Elective | 1 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| BUS 360 Marketing Methods *or* | |
| TAM 382 Prin. of Soft Goods Mktg. | 3 |
| TAM 331 Qual. Control. Text. Production Mgmt. | 3 |
| TC 301 Technology of Dyeing & Finishing | 4 |
| COM 146 Bus. & Professional Comm. *or* | |
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 332 Comm. for Business & Mgmt. *or* | |
| ENG 333 Comm. for Sci. & Research | 3 |
| TAM 380 Mgmt. & Control. Text. Applic. Systems.[3] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| TAM 480 Prod. Mgmt. Dec. Text. Oper. | 3 |
| TAM 481 Prod. Cost Text. & Applic. | 3 |
| Textile Elective[4] | 3 |
| Textile Elective[4] | 3 |
| Mgmt. Elective[5] | 3 |
| | 15 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| TAM 482 Textile Mktg. Mgmt. | 3 |
| TAM 495 Senior Seminar Text. & Applic. | 1 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Mgmt. Elective[3] | 3 |
| Textile Elective[4] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| TAM 484 Mgmt. Dec. Mak. Text. Firm | 3 |
| Humanities/Soc. Sci. Elective[2] | 3 |
| Mgmt. Elective[3] | 3 |
| Textile Elective[4] | 3 |
| | 12 |

Minimum Hours Required for Graduation ..... 123

Foreign language proficiency at the FL_ 102 level is required for graduation, either by taking FL_ 102 or by placement out of FL_ 102.

It is strongly suggested to all students to take Free Electives as permitted by their schedule.

A Physics sequence (e.g. PY 205/PY 208 or PY 211/PY 212) is strongly suggested for students who see themselves working in research related areas.

[1]Prerequisite for PY 205 is MA 141 with grade C or better.

[2]Within the Humanities/Social Sci electives that have not been specified the following criteria must be met:

- Two courses (6 CR) must be from the "History Electives" or "Literature Electives" lists.
- One course (3 CR) must be from any of the lists "Philosophy Electives," "Religion Electives," "Visual and Performing Arts Electives."
- One course (3 CR) must be from any of the lists "Psychology Electives," "Economics Electives," "Politics and Government Electives," "Sociology Electives," "Anthropology Electives," "Cultural Geography Electives."
- One of these course must be from the lists of "Courses on Non-English Speaking Cultures."
- One of these courses must be from the list "Science, Technology, and Society (Humanities and Social Science Perspective)."

[3]A minimum grade of C is required in EC 201, ACC 280, and TAM 380 for graduation in this concentration. Credit is not allowed for both ACC 280 and the ACC 210/ACC 220 series.

[4]Textile Electives:

A minimum of 12 Credit Hours of Textile Electives is required towards the degree. Students will select four courses from the following list:

TT 305, TT 320, TT 341, TT 350, TT 351, TT 370, TT 405, TT 420, TT 425, TT 443, TT 450, TT 451, TAM 383, TAM 431*, TAM 487*, TAM 490**, TAM 401.

* Students in the Apparel Management concentration must take TAM 431 and TAM 487 as Textile Electives.

** Credit towards the Textile Electives will only be given for TAM 490.

[5]Management Electives:

A minimum of three courses from one of the following options is required for the Textile Management Concentration. These courses can also count towards Minors (e.g. in Accounting, Business Management, Industrial Engineering) or a double degree program in International Studies (the Eli Whitney Scholars Program). Minors and double degrees will require additional courses, so that such programs have to be prepared by the individual student with care.

Production Factors Option:

IE 307, IE 311, PSY 340, TAM 401, BUS 346, BUS 464, BUS 465, EC 448, TAM 490.

Labor and Law:

TAM 381, TAM 487, BUS 307, BUS 308, BUS 332, EC 431, TAM 401, PSY 307, PSY 340, PHI 314, TAM 490, T493.

Management Science:

MA 405, MA 421, MA 425, MA 426, MA 511, MA 512, BUS 310, BUS 420, BUS 422, EC 451, TAM 490.

Finance and Accounting:

ACC 210, ACC 220, ACC 310, ACC 311, ACC 320, ACC 330, ACC 420, BUS 404, BUS 420, BUS 422, BUS/EC 449, TAM 490.

[6]The first two Physical Education courses do not count towards the minimum credit for graduation.

# DEPARTMENT OF TEXTILE ENGINEERING, CHEMISTRY, AND SCIENCE

College of Textiles, Centennial Campus, Room 3250

M. H. Mohamed, *Head*

B. S. Gupta, *Associate Head, Director of Undergraduate Programs*

K. R. Beck, *Associate Head, Director of Graduate Programs*

*Alumni Distinguished Undergraduate Professor:* C. D. Livengood; *Burlington Professor:* M. H. Mohamed; *Ciba-Geigy Professor:* H. S. Freeman; *Cone Mills Professor:* R. McGregor; *Professors:* R. L. Barker, K. R. Beck, D. R. Buchanan, H. S. Freeman, P. L. Grady, B. S. Gupta, C. D. Livengood, R. McGregor, G. N. Mock, M. H. Mohamed, C. B. Smith, M. H. Theil, C. Tomasino, A. E. Tonelli, P. A. Tucker; *Adjunct Professors:* R. Goldman, T. Iijima, R. K. Koger, J. B. Levy, J. Preston, L. G. Roldan, T. Tam; *Professors Emeriti:* J. F. Bogdan, K. S. Campbell, D. M. Cates, J. A. Cuculo, P. D. Emerson, R. D. Gilbert, D. S. Hamby, S. P. Hersh, P. R. Lord, H. A. Rutherford, W. K. Walsh, W. M. Whaley; *Associate Professors:* T. G. Clapp, H. Hamouda, S. M. Hudson, C. M. Pastore, J. W. Rucker, J. P. Rust; *Adjunct Associate Professors:* W. P. Behnke, L. D. Claxton, W. R. Martin Jr.; *Associate Professors Emeriti:* T. H. Guion, A. C. Hayes, T. G. Rochow; *Assistant Professors:* W. J. Jasper, M. G. McCord; *Adjunct Assistant Professors:* A. C. Bullerwell, J. Roper; *Associate Members of the Faculty:* S. K. Batra (Textile and Apparel Management), R. E. Fornes (Physics).

For more information contact Dr. B. S. Gupta, Room 3251 at (919)515-6559.

The Department of Textile Engineering, Chemistry, and Science offers bachelor of science degrees embracing a number of disciplines. Students receive a fundamental knowledge of the science and engineering involved in the production of polymers, fibers, yarns and fabrics, and products based on them, and the process of dyeing and finishing.

## CURRICULA

The B.S. in Textile Chemistry is heavily oriented to the chemistry of polymers, their formation, and the preparation of textile materials for the consumer including scouring, bleaching, printing, dyeing and finishing. The degree program offers five different concentrations: Dyeing and Finishing Management, Dyeing and Finishing Operations, Dyeing and Finishing Science, Polymer Chemistry and, General Studies.

The first two concentrations are primarily for students who wish to pursue a bachelor of science degree, whereas the other three concentrations are oriented toward students wanting advanced studies. However, the student taking dyeing and finishing operations or dyeing and finishing management can use elective courses to achieve a background suitable for graduate studies. The General Studies concentration qualifies students for ACS (American Chemical Society) certification.

The B.S. in Textile Engineering provides a broad base of fundamental engineering courses as a foundation for studies in textile engineering. The textile engineering courses deal with the application of scientific and engineering principles to the design and control of all aspects of fiber, textile and apparel processes, products and machinery. These include natural and man-made materials, interaction of materials with machines, safety and health, energy conservation, and waste and pollution control. The B.S. in Textile Engineering is offered jointly with the College of Engineering. For more details about the program, see description under the College of Engineering.

The B.S. in Textile Materials Science provides students with a fundamental knowledge of textile materials, including the science of modern materials and composites, as well as a technical understanding of the interactions between materials and machines in manufacturing operations. This curriculum combines elements of fiber physics, engineering, polymer science and production technology. It incorporates modern aspects of fiber materials science, including composites and advanced materials, computer applications and modern measurements into a science based program.

## CURRICULUM IN TEXTILE CHEMISTRY
## DYEING AND FINISHING MANAGEMENT CONCENTRATION
## Degree earned: B.S. in Textile Chemistry

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 131 Analytic Geom. & Calculus A *or* | |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Any 100-level PE in Fitness & Wellness | 1 |
| TC 105 Intro. to Text. & Computers | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 Prin. of Chemistry | 3 |
| CH 127 Prin. of Chemistry Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 231 Analytic Geom. & Calculus B *or* | |
| MA 241 Analytic Geom. & Calculus II | 3(4) |
| TC 203 Intro. to Polymer Chemistry | 3 |
| Physical Education Elective | 1 |
| | 14-15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 221 Organic Chemistry I | 4 |
| PY 205 Physics for Engr. & Sci. I *or* | |
| PY 211 College Physics I | 4 |
| TMS 211 Intro. to Fiber Sci. | 3 |
| Humanities/Soc. Sci. (EC 201)[1] | 3 |
| Physical Education Elective | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| PY 208 Physics for Engr. & Sci. II *or* | |
| PY 212 College Physics II | 4 |
| TC 301 Technology of Dyeing & Finishing | 4 |
| Humanities/Soc. Sci. (PSY 200)[1] | 3 |
| | 15 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 333 Comm. for Sci. & Research | 3 |
| TC 310 Text. Preparation & Finishing Chemistry | 3 |
| TC 441 Physico-Chemical Processes Text. I | 3 |
| TMS 210 Yarn & Fabric Form. & Properties | 4 |
| TC 461 Intro. to Fiber-Forming Polymers | 4 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| TC 305 Intro. to Color Sci., & Applic. | 3 |
| TC 320 Text. Dyeing & Printing | 3 |
| TC 412 Text. Chemical Analysis | 3 |
| TC 442 Physico-Chemical Processes Text. II | 3 |
| Physical Education Elective | 1 |
| Humanities/Soc. Sci.Elective (PSY 307)[1] | 3 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ACC 280 Managerial Accounting | 3 |
| TAM 380 Mgmt. & Control. Text. Applic. Systems. | 3 |
| Humanities/Soc. Sci. Electives[1] | 6 |
| Textile Chemistry Elective[2] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| TAM 480 Text. Prod. & Cost Control. | 3 |
| TC 401 Environ. Sci., Text. | 3 |
| TC 407 Wet Proc. Opern. & QC | 3 |
| Humanities/Soc. Sci. Electives[1] | 6 |
| | 15 |

Minimum Hours Required for Graduation ..... 122

[1]Humanities and Social Science and Other Requirements (21 hours minimum). All courses must be completed with regular grading.

a. Select two courses from the list of history courses or two courses from the list of literature courses.The literature courses should be selected from the same language.
b. Select one course from the list of philosophy, religion, or visual/performing arts courses.
c. To satisfy the program requirements, EC 201, PSY 200 and PSY 307 must be taken.
d. Select one course from the list of science, technology and society courses (humanities and social science perspective).
e. At least one of the above unspecified courses must focus on a non-English speaking culture.
f. Competency in a foreign language at the 102 level is required for graduation.

[2]Any TC course including T 493 and T 497. (NOTE: GPA and/or prerequisite restrictions may apply. Consult the catalog and the instructor.)

## CURRICULUM IN TEXTILE CHEMISTRY
## DYEING AND FINISHING OPERATIONS CONCENTRATION
## Degree earned: B.S. in Textile Chemistry

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 131 Analytic Geom. & Calculus A *or* | |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Any 100-level PE in Fitness & Wellness | 1 |
| TC 105 Intro. to Text. & Computers | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 Prin. of Chemistry | 3 |
| CH 127 Prin. of Chemistry Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 231 Analytic Geom. & Calculus B *or* | |
| MA 241 Analytic Geom. & Calculus II | 3(4) |
| TC 203 Intro. to Polymer Chemistry | 3 |
| Physical Education Elective | 1 |
| | 14-15 |

## SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 221 Organic Chemistry I | 4 |
| PY 205 Physics for Engr. & Sci. I *or* | |
| PY 211 College Physics I | 4 |
| TMS 211 Intro. to Fiber Sci. | 3 |
| Humanities/Soc. Sci. Elective[1] | 3 |
| Physical Education Elective[1] | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| PY 208 Physics for Engr. & Sci. II *or* | |
| PY 212 College Physics II | 4 |
| TC 301 Technology of Dyeing & Finishing | 4 |
| Humanities/Soc. Sci. Elective[1] | 3 |
| Physical Education Elective. | 1 |
| | 15 |

## JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| TC 310 Text. Preparation & Finishing Chemistry | 3 |
| TC 441 Physico-Chemical Processes Text. I | 3 |
| TC 461 Intro. to Fiber-Forming Polymers | 4 |
| TMS 210 Yarn & Fabric Form. & Properties | 4 |
| Humanities/Soc. Sci. Elective[1] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 333 Comm. for Sci. & Research | 3 |
| TC 305 Intro. to Color Sci. & Its Applic. | 3 |
| TC 320 Text. Dyeing & Printing | 3 |
| TC 412 Text. Chemical Analysis | 3 |
| TC 442 Physico-Chemical Processes Text II | 3 |
| | 15 |

## SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Humanities/Soc. Sci. Electives[1] | 6 |
| Restricted Elective[2] | 3 |
| Textile Chemistry Elective[3] | 3 |
| Textile Elective[4] | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| TC 401 Environ. Sci. Text. | 3 |
| TC 407 Wet Proc. Opern. & QC | 3 |
| Humanities/Soc. Sci. Electives[1] | 6 |
| Free Elective | 1 |
| | 13 |

Minimum Hours Required for Graduation ..... 120

[1]Humanities and Social Science and Other Requirements (21 hours minimum). All courses must be completed with regular grading.

a. Select two courses from the list of history courses or two courses from the list of literature courses. The literature courses should be selected from the same language.
b. Select one course from the list of philosophy, religion, or visual/performing arts courses.
c. Select two courses from any one of the following social science areas: anthropology, cultural geography, economics, politics and government, psychology, sociology.
d. Select one course from the list of science, technology and society courses (humanities and social science perspective).
e. Select one course from any of the disciplines of humanities and social sciences.
f. At least one of the above seven (7) courses must focus on a non-English speaking culture.
g. Competency in a foreign language at the 102 level is required for graduation.

[2]Restricted Elective (3 hours). Choose from the following: ST 361, ACC 280, any chemistry or mathematics course at 200 or above level.

[3]Textile Chemistry Elective (3 hours). Any TC course.

[4]Textile Elective (3 hours). Any T, TAM, TES, TMS or TT course.

# CURRICULUM IN TEXTILE CHEMISTRY
# DYEING AND FINISHING SCIENCE CONCENTRATION
## Degree earned: B.S. in Textile Chemistry

### FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Any 100-level PE in Fitness & Wellness | 1 |
| TC 105 Intro. to Text. & Computers | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 Prin. of Chemistry | 3 |
| CH 127 Prin. of Chemistry Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| TC 203 Intro. to Polymer Chemistry | 3 |
| Physical Education Elective | 1 |
| | 15 |

### SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 221 Organic Chemistry I | 4 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| PY 205 Physics for Engr. & Sci. I | 4 |
| TMS 211 Intro to Fiber Sci. | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| MA 341 Appl. Diff. Equations I | 3 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| TC 301 Technology of Dyeing & Finishing | 4 |
| Physical Education Elective | 1 |
| | 16 |

### JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| TC 310 Text. Preparation & Finishing Chemistry | 3 |
| TMS 210 Yarn & Fabric Form & Prop | 4 |
| Humanities/Soc. Sci. Electives[1] | 6 |
| Phys. Chemical/Thermdyn. Elective[2] | 3 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 333 Comm. for Sci. & Research | 3 |
| TC 305 Intro. to Color Sci. & Applic. | 3 |
| TC 320 Text. Dyeing & Printing | 3 |
| TC 412 Text. Chemical Analysis | 3 |
| Phys. Chemical/Thermdyn. Elective[2] | 3 |
| | 15 |

### SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| TC 461 Intro. to Fiber-Forming Polymers | 4 |
| Restricted Elective[3] | 3 |
| Humanities/Soc. Sci. Electives[1] | 9 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| TC 401 Environ. Sci. Text. | 3 |
| TC 407 Wet Proc. Opern. & QC | 3 |
| Humanities/Soc. Sci. Electives[1] | 6 |
| Physical Education Elective | 1 |
| | 13 |

Minimum Hours Required for Graduation ..... 121

[1]Humanities and Social Science and Other Requirements (21 hours minimum). All courses must be completed with regular grading.

a. Select two courses from the list of history courses or two courses from the list of literature courses. The literature courses should be selected from the same language.
b. Select one course from the list of philosophy, religion, or visual/performing arts courses.
c. Select two courses from any one of the following social science areas: anthropology, cultural geography, economics, politics and government, psychology, sociology.
d. Select one course from the list of science, technology and society courses (humanities and social science perspective).

e. Select one course from any of the disciplines of humanities and social sciences.
f. At least one of the above seven (7) courses must focus on a non-English speaking culture.
g. Competency in a foreign language at the 102 level is required for graduation.
[2]Physical Chemistry/Thermodynamics (6 hours). CH 431 and CH 433 or TC 441 and TC 442.
[3]Restricted Elective (3 hours). Choose any T, TC, TES, TMS or TT course.

## CURRICULUM IN TEXTILE CHEMISTRY
## POLYMER CHEMISTRY CONCENTRATION
## Degree earned: B.S. in Textile Chemistry

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 3 |
| CH 121 General Chemistry I Lab | 1 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytic Geom. & Calculus I | 4 |
| Any 100-level PE in Fitness & Wellness | 1 |
| TC 105 Intro. to Text. & Computers | 3 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 Prin. of Chemistry | 3 |
| CH 127 Prin. of Chemistry Lab | 1 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytic Geom. & Calculus II | 4 |
| TC 203 Intro. to Polymer Chemistry | 3 |
| Physical Education Elective | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 221 Organic Chemistry I | 4 |
| MA 242 Analytic Geom. & Calculus III | 4 |
| PY 205 Physics for Engr. & Sci. I | 4 |
| TMS 211 Intro. to Fiber Sci | 3 |
| Physical Education Elective | 1 |
| | 16 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 223 Organic Chemistry II | 4 |
| MA 341 Appl. Diff. Equations I | 3 |
| PY 208 Physics for Engr. & Sci. II | 4 |
| TC 301 Technology of Dyeing & Finishing | 4 |
| | 15 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| ENG 331 Comm. for Engr. & Technology *or* | |
| ENG 333 Comm. for Sci. & Research | 3 |
| TC 461 Intro. to Fiber-Forming Polymers | 4 |
| TMS 210 Yarn & Fabric Formation & Properties | 4 |
| Humanities/Soc. Sci. Elective[1] | 3 |
| Phys. Chemical/Thermdyn. Elective[2] | 3 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| TC 305 Intro. to Color Sci. & Its Applic. | 3 |
| TC 412 Textile Chemical Analysis | 3 |
| Humanities/Soc. Sci. Electives[1] | 6 |
| Phys. Chemical/Thermdyn. Elective[2] | 3 |
| Physical Education Elective | 1 |
| | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| Dyeing & Finishing Elective[3] | 3 |
| Humanities/Soc. Sci. Electives[1] | 6 |
| Polymer Chemistry Electives[3] | 6 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| TC 401 Environ. Sci. Text. | 3 |
| TC 466 Polymer Chemistry Lab | 3 |
| Humanities/Soc. Sci. Electives[1] | 6 |
| Polymer Chemistry Elective[3] | 3 |
| | 15 |

Minimum Hours Required for Graduation ..... 124

Humanities and Social Science and Other Requirements (21 hours minimum). All courses must be completed with regular grading.

a. Select two courses from the list of history courses or two courses from the list of literature courses. The literature courses should be selected from the same language.
b. Select one course from the list of philosophy, religion, or visual/performing arts courses.
c. Select two courses from any one of the following social science areas: anthropology, cultural geography, economics, politics and government, psychology, sociology. One course must be at an advanced level.
d. Select one course from the list of science, technology and society courses (humanities and social science perspective).
e. Select one course from any of the disciplines of humanities and social sciences.
f. At least one of the above seven (7) courses must focus on a non-English speaking culture.
g. Competency in a foreign language at the 102 level is required for graduation.

•Physical Chemistry/Thermodynamics (6 hours). CH 431 and CH 433 or TC 441 and TC 442.

•Dyeing and Finishing Elective (3 hours). Choose any one of the following courses: TC 310, TC 320, TC 407, TC 505, TC 506, TC 520, TC 521, TC 530, or TC 591. (NOTE: GPA and pre-requisite restrictions may apply to the graduate courses. Consult the catalog and the instructor.)

•Polymer Chemistry Electives (9 hours).

a. Choose 6 hours from the following: T 402, TMS 460, TC 504, TC 561, TC 562, TC 565, and TC 569.
b. Choose 3 hours from either the list above or the following: T 493, T 497, T 498 (1–3 hours), TC 490, TC 591.

(NOTE: GPA and prerequisite restrictions may apply to the above courses. Consult the catalog and the instructor.)

## CURRICULUM IN TEXTILE CHEMISTRY
## GENERAL STUDIES CONCENTRATION
## Degree earned: B.S. in Textile Chemistry

FRESHMAN YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 101 General Chemistry I | 4 |
| CH 121 General Chemistry I Lab | 0 |
| ENG 111 Comp. & Rhetoric | 3 |
| MA 141 Analytical Geom & Calculus I | 4 |
| TC 105 Intro to Text. & Computers | 3 |
| Any 100-level PE in Fitness & Wellness | 1 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 107 Prin. of Chemistry | 4 |
| CH 127 Prin. of Chemistry Lab | 0 |
| ENG 112 Comp. & Reading | 3 |
| MA 241 Analytical Geom & Calculus II | 4 |
| TC 203 Intro to Polymer Chemistry | 3 |
| Physical Education Elective | 1 |
| | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* |
|---|---|
| MA 242 Analytic Geom. & Calculus III | 4 |
| PY 205 Physics for Engr & Sci. I | 4 |
| TMS 211 Intro. to Fiber Sci. | 3 |
| Physical Education Elective | 1 |
| CH 221 Organic Chemistry I | 4 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| MA 341 Appl. Diff. Equations | 3 |
| PY 208 Physics for Engr & Sci. II | 4 |
| TC 301 Survey Dyeing & Finishing | 4 |
| Physical Education Elective | 1 |
| CH 223 Organic Chemistry | 4 |
| | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 431 Physical Chemistry I | 3 |
| CH(TC) 461 Intro. Fiber-forming Polymers | 4 |
| ENG 331 Comm for Engr & Technology or | |
| ENG 333 Comm for Sci. & Research | 3 |
| Humanities/Soc. Sci. Elective | 3 |
| TMS 210 Yarn/Fabric Form & Prop | 4 |
| | 17 |

| *Spring Semester* | *Credits* |
|---|---|
| CH 433 Physical Chemistry II | 3 |
| TC 305 Intro. Color Sci. & Applic | 3 |
| TC 412 Textile Chemical Analysis* | 3 |
| TC 401 Environ Aspects Text. Industry | 3 |
| Humanities/Soc. Sci. Elective | 3 |
| Humanities/Soc. Sci.Elective | 3 |
| | 18 |

SENIOR YEAR

| *Fall Semester* | *Credits* |
|---|---|
| CH 401 Systematic Inorganic Chemistry I | 3 |
| Adv. Chemistry Elective [1*] | 3 |
| Polymer Chemistry Elective [2] | 3 |
| Humanities/Soc.Sci. Electives (two courses) | 6 |
| | 15 |

| *Spring Semester* | *Credits* |
|---|---|
| Advanced TC Elective [3*] | 3 |
| TC 466 or TC 407 (Capstone*) | 3 |
| DF Elective [4] | 3 |
| Humanities/Soc. Sci. Electives (two courses) | 6 |
| | 15 |

Minimum Credit Hours Required for Graduation ..... 127

[1]Humanities and Social Science and Other Requirements (21 hours minimum). All courses must be completed with regular grading.

a. Select two courses from the list of history courses or two courses from the list of literature courses. The literature courses should be selected from the same language.
b. Select one course from the list of philosophy, religion, or visual/performing arts courses.
c. Select two courses from any one of the following social science areas: anthropology, cultural geography, economics, politics and government, psychology, sociology.
d. Select one course from the list of science, technology and society courses (humanities and social science perspective).
e. Select one course from any of the disciplines of humanities and social sciences.
f. At least one of the above seven (7) courses must focus on a non-English speaking culture.
g. Competency in a foreign language at the 102 level is required for graduation.

[2]CH 403, CH 415/416, CH 434, CH 435, PY 407, or any CH 500-level course except CH 530.
[3]T 402, T 492, TMS 460, TC 504, TC 505, TC 506, TC 525, TC 561, TC 562, TC 565, TC 569.
[4]TC 490, TC 505, TC 525, TC 561, TC 562, or any other TC course with a physical chemistry prerequisite.
[5]TC 310, TC 320, TC 490, TC 506, TC 520, or TC 530.

## MINOR IN TEXTILE CHEMISTRY

The Textile Engineering, Chemistry, and Science Department offers a minor in textile chemistry to majors in any field except Textile Chemistry. The program is designed to expose students to the technical and scholarly disciplines of polymer chemistry, fiber formation, color physics, dyeing, and chemical modification of fabrics, and gives them an opportunity to learn how basic disciplines are applied in an industrial environment. Any interested student should contact the associate department head of Textile Engineering, Chemistry, and Science for information about the minor and its prerequisites.

## B.S. DEGREE IN TEXTILE ENGINEERING

(See Textile Engineering curriculum under College of Engineering.)

## CURRICULUM IN TEXTILE MATERIALS SCIENCE

### Degree earned: B.S. in Textile Materials Science

FRESHMAN YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| CH 101 General Chemistry I | 3 | CSC 114 Intro. to Comp.- C++[3] | 3 |
| CH 121 General Chemistry I Lab | 1 | ENG 112 Comp. & Reading | 3 |
| E 115 Intro. to Comp. Environ. | 1 | MA 241 Analytic Geom. & Calculus II | 4 |
| ENG 111 Comp. & Rhetoric | 3 | BIO 125 General Biology *or* | |
| MA 141 Analytic Geom. & Calculus I | 4 | CH 107 General Chemistry II *and* | |
| Any 100-level PE in Fitness & Wellness | 1 | CH 127 General Chemistry II Lab | 4 |
| TMS 106 Modern Applic. Text. Materials Sci. | 2 | Physical Education Elective | 1 |
| | 15 | | 15 |

SOPHOMORE YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| MA 242 Analytic Geom. & Calculus III | 4 | MA 341 Appl. Diff. Equations I | 3 |
| PY 205 Physics for Engr. & Sci. I | 4 | MAE 206 Engineering Statics | 3 |
| TMS 211 Intro. to Fiber Sci. | 3 | PY 208 Physics for Engr. & Sci. II | 4 |
| Humanities/Soc. Sci. Elective[1] | 3 | TC 203 Intro. to Polymer Chemistry | 3 |
| Physical Education Elective | 1 | Humanities/Soc. Sci. Elective[1] | 3 |
| | 15 | | 16 |

JUNIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| MAE 314 Solid Mechanics | 3 | ENG 331 Comm. for Engr. & Technology | 3 |
| TC 301 Technology of Dyeing & Finishing | 4 | ST 361 Intro. Stat. for Engr. | 3 |
| TE 301 Textile Mfg. Processes I | 4 | TAM 380 Mgmt. & Control. of Text. Systems. | 3 |
| TMS 361 Physical Prop. of Text. Materials | 3 | TE 302 Textile Mfg. Processes II | 4 |
| Physical Education Elective | 1 | TMS 362 Geom. & Mechanics of Text. Materials | 3 |
| | 15 | | 16 |

SENIOR YEAR

| *Fall Semester* | *Credits* | *Spring Semester* | *Credits* |
|---|---|---|---|
| TMS 465 Text. Composite Materials | 3 | TMS 472 Text. Materials Design II | 3 |
| TMS 471 Text. Materials Design I | 3 | Humanities/Soc. Sci. Electives[1] | 9 |
| Humanities/Soc. Sci. Electives[1] | 6 | Restricted Elective[2] | 3(4) |
| Restricted Elective[2] | 3 | | 15-16 |
| | 15 | | |

Minimum Hours Required for Graduation ..... 122

Prerequisite Requirements for all Textile Material Science Students: Before a student in the TMS program is eligible to enroll in a 200 or higher level engineering course, he/she must have earned a grade of C or better in ENG 111, MA 141, MA 241, PY 205, and CH 101, and passed CSC 114 (or 110 or 112) and at least one humanities or social science course.

[1]Humanities and Social Science and Other Requirements (21 hours minimum). All courses must be completed with regular grading.

a. Select two courses from the list of history courses or two courses from the list of literature courses.The literature courses should be selected from the same language..
b. Select one course from the list of philosophy, religion, or visual/performing arts courses.
c. To satisfy the program requirements, EC 201 must be taken.
d. Select one course from any one of the following social science areas: anthropology, cultural geography, economics, politics and government, psychology, sociology.
e. Select one course from the list of science, technology and society courses (humanities and social science perspective).
f. Select one course from any of the disciplines of humanities and social sciences.
g. At least one of the unspecified courses must focus on a non-English speaking culture.
h. Competency in a foreign language at the 102 level is required for graduation.

[2]Restricted Electives (6–7 hours). Select two courses from:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TAM 330 | 4 | T 402 | 3 | TES 500 | 3 | T 493 | 3 |
| TC 401 | 3 | TT 305 | 3 | TT 351 | 3 | TT 370 | 3 |

[3]Students may substitute CSC 110 or 112 for 114

# COLLEGE OF VETERINARY MEDICINE

*4700 Hillsborough Street*
*NCSU BOX 8401*
*Raleigh, N. C. 27695-8401*
*FAX: (919) 829-4452*

*Admissions: (919) 829-4205*
*Recruitment: (919) 829-4214*
*Academic Affairs: (919) 829-4212*
*Internet E-mail:vetmed@ncsu.edu*

O. J. Fletcher, *Dean*

D. J. DeYoung, *Associate Dean and Director of Veterinary Services*

D. G. Bristol, *Associate Dean and Director of Academic Affairs*

J. H. Britt, *Associate Dean and Director of Graduate Studies & Research*

T. E. Hamm, *Director of Laboratory Animal Resources*

C. A. DeLuca, *Director of Admissions and Graduate Programs*

R. L. Waters, *Director of Recruitment and Career Planning*

No specific undergraduate degree track is associated with a pre-professional veterinary medicine program. Faculty members from the College of Agriculture and Life Sciences serve as advisors to undergraduate students interested in Veterinary Medicine that are enrolled and pursuing a baccalaureate program usually in a science-related field. Pre-professional course requirements are listed below. After completion of the required courses, students may be eligible to apply for the professional veterinary program. Course requirements may be changed annually and are determined by the Committee on Admissions in the College of Veterinary Medicine.

Undergraduate students with interest in veterinary medicine are **expected to be pursuing a baccalaureate degree** (to include the social science and humanities requirements in the appropriate curriculum). Minimum requirements and course stipulations for curriculum planning should be followed through each of the students and their pre-professional advisors to be knowledgeable of those requirements.

****University Physical Education requirements have been modified. It is recommended that students consult with their adviser on specific curriculum requirements regarding PE.*

All courses listed below should be completed by the time of application to the veterinary college except two courses may be pending completion in the spring semester, term, or quarter, of the year of application.

## PRE-PROFESSIONAL COURSE REQUIREMENTS

ANS 230,250 Applied Animal Nutrition ..... 3
or NTR 301 Modern Nutrition ..... 3
or PO (NTR< ANS)415 Comparative Nutrition ..... 3
BCH 451 Introductory Biochemistry ..... 4
BIO 125 General Biology ..... 4
CH 101 General Chemistry I and CH 121 Lab ..... 4
CH 107 General Chemistry II and CH 127 Lab ..... 4
CH 221 Organic Chemistry I and Lab ..... 4
CH 223 Organic Chemistry II and Lab ..... 4
ENG 111 Comp. and Rhetoric ..... 3
ENG 112 Comp. and Reading ..... 3
GN 411 Prin. of Genetics ..... 4
MA 131 Analytic Geom. and Calculus A
or MA 231
or MA 121 Elements of Calculus ..... 4
MB 351 General Microbiology ..... 4
PY 211 College Physics I and Lab ..... 4
PY 212 College Physics II and Lab ..... 4
ST 311 Intro. to Statistics ..... 3

Humanities Electives ..... 6
Social Sciences Electives ..... 6

## PROFESSIONAL DEGREE PROGRAM AND CAREER OPPORTUNITIES

Veterinary medicine is a science career dealing with the recognition, treatment, control and prevention of diseases in animals. Career options are unlimited and varied as animal health affects the health and economic welfare of the nation. DVM candidates may select several career options upon graduation. Federal government, private industry, private practice, and research and teaching activities in a university setting are all possible for licensed graduates. Successful completion of the professional training program should prepare students for appropriate North Carolina state licensing examinations. Persons interested in the professional courses offered may receive a brochure by contacting the College of Veterinary Medicine, Office of Student Services, Raleigh, NC or view the college website at http://www2.ncsu.edu/ncsu/cvm/instruction/admissions/

# DEPARTMENT OF ANATOMY, PHYSIOLOGICAL SCIENCES AND RADIOLOGY

A. L. Aronson, *Head*

*Alumni Distinguished Professor:* J. E. Smallwood, *Burroughs Wellcome Professor:* J. E. Riviere; *Professors:* K. B. Adler, R.A. Argenzio, A.L. Aronson, J. H. Britt, C. F. Brownie, L.N. Fleisher, N. C. Olson, J. E. Riviere, P.L. Sannes, J. E. Smallwood, C. S. Teng, D. E. Thrall; *Director:* P. Fisher, *Adjunct Professors:* R. Cooper, L.M. Jones, H. Koren, J.A. Raleigh, F. Welsch: *Associate Professors:* S. A. Bai, H. M. Berschneider, J. E. Gadsy, L.C. Hudson, R.E. Meyer, M.G. Papich, B.P. Peters, C.L. Robinette, K.A. Spaulding, C.R. Swanson, *Adjunct Associate Professors:* W.J. Croom, D.C. Dorman, K.L. Dreher, T.E. Eling, G. Huntington, J.M. Rhoads, C.T. Teng, R. Voyksner; *Assistant Professors:* J. B. Allen, W. Horne, N.E. Love, I.W. Smoak; *Adjunct Assistant Professors:* J. C. Bonner, M. W. Dewhirst, D.M. Prescott, S.H. Randell; *Research Professor:* M.C. McGahan, *Research Assistant Professor:* G. Qiao; *Visiting Assistant Instructor:* J. Douglass; *Visiting Instructor:* Lisa Shaw: *Senior Research Associate:* K. Tyczkowska: *Laboratory Supervisors:* N. Akley, J.Brooks: *Research Associates:* B. Case, C. Li. H. Li, L. Martin, I. Pagan, L. Rochelle.

# DEPARTMENT OF COMPANION ANIMAL AND SPECIAL SPECIES MEDICINE

E.A. Stone, *Head*

*Professors:* C.E. Atkins, E.B. Breitschwerdt, S.E. Bunch, D.J. DeYoung, R.B. Ford, T.E. Hamm, N. Monteiro-Riviere, E.J. Noga, R.L. Page, E.A.Stone, M.K. Stoskopf; *Adjunct Professors:* C.F.Abrams, C.W. Betts, S.W. Crane, J.D. Fine, J.N. Kornegay, *Associate Professors:* M. G. Davidson, K. Flammer, W.J. Fleming (Assoc. Status), E.M. Hardie, E.C. Hawkins, B.W. Keene; *Adjunct Associate Professors:* V.A. Brown, W. J. Fleming, D.I. Hammer, J. Hinshaw, D.A. Hudson, K.G. Kagan, J.C. LeMay, M. R. Loomis, D. C. Richardson, J.V. Russell, C.L. Ward, N.A. Watson, M.R. Zalutsky; *Assistant Professors:* L.A. Degernes, G.A. Lewbart, D.J. Marcellin, S.G. Price, S.C. Roe, N.J.H. Sharp, G.J. Spodnick, S.L. Vaden, B.J. Weigler; *Adjunct Assistant Professors:* H.M. Aberman, B.A. Atlee, S. Botts, S.D. Crissey, J. Eichenbaum, P.J. Gengo, T.L. Glover, D.E. Harling, P.B. Luther, J.G. Massey, T.M. Norton, T.L. Sifers, B.S. Simpson; *Adjunct Instructors:* E.M. Clary, P.S. Kuder, *Clinical Assistant Professors:* B.D. Hansen, M.L. Hauck, *Visiting Clinical Instructors:* T.C. DeFrancesco, J.C. Meeks, K.L. Wells, *Research Assistant Professors:* K.L. Joyner, R.K. Sellon.

# DEPARTMENT OF FOOD ANIMAL AND EQUINE MEDICINE

M. C. Roberts, *Head*

*Professors:* K.L. Anderson, H.J. Barnes, O.J. Fletcher, W.D. Oxender, M.C. Roberts, L.P. Tate; *Associate Professors:* G.W. Almond, K.F. Bowman, B.A. Breuhaus, D.G. Bristol, W.Duckett, E.Hunt, D.H. Ley. S. Van Camp, D.P. Wages, M. D. Whitacre; *Assistant Professors:* P. R. Davies, J. Deen, M.M. McCaw, G.M. Rogers, D.L. Sellon, B.D. Slenning, S.L. Vivrette; *Visiting Instructors:* R.A. Mansmann, A.M. Miles; *Swine Extension Specialist:* M. Morrow; *Poultry Extension Specialist:* D.V. Rives; *Adjunct Associate Professors:* E.C. Gonder, L.L. Munger, D.V. Rines, A.B. Scheidt; *Adjunct Assistant Professor:* G. Griffith.

# DEPARTMENT OF MICROBIOLOGY, PATHOLOGY, AND PARASITOLOGY

L. Perryman, *Head*

*Alumni Distinguished Professor:* R.C. Dillman; *Professors:* T.T. Brown Jr., P.B. Carter, J.M. Cullen, E.V. DeBuysscher, F. J. Fuller, J. Guy, B. Hammerberg, M.G. Levy, D.J. Meuten, P.E. Orndorff, L.E. Perryman, M. Tompkins, W. Tompkins; *Adjunct Professors:* J.K. Atwell, R. Johnston, R. Pool, M. Selgrade; *Visiting Professor*: F. Perkins; *Professors Emeriti:* E.G. Batte, H.A. Berkhoff, L. Coggins, R. C. Dillman, D.J. Moncol; *Associate Professors:* P. Cowen, C.B. Grindem, J.Levine, B. Sherry, S.L. Tonkonogy; *Adjunct Associate Professors:* G. Boorman, R. C. Cattley, J. Everitt, T.J. Goldsworthy, J. F. Hardisty, W.F. MacKenzie, P. Mann, R.R. Maronpot, E.E. McConnell, K.T. Morgan, R. Peiffer, J.Wright; *Assistant Professors:* C. Altier, P. Arasu, M.T. Correa, G. Dean, J. Law, R. Miller; *Adjunct Assistant Professors:* M.R. Wells, D.C. Wolf; *Director of Electron Microscopy:* M.J. Dysktra; *Visiting Research Associate Professor:* S Kennedy-Stoskopf; *Visiting Assistant Professors:* J. Andrews, R. English, J. Flowers; *Visiting Instructors:* F. Geoly, A. Kwock; *Visiting Scientists:* I. Belyakov, T. Hamrick; *Associate Members of Faculty:* J.J. Arends, S.M. Laster, M. Qureshi, A.Weeks-Perkins.

# OTHER ACADEMIC AND ADMINISTRATIVE UNITS

## Division of Undergraduate Studies

*B26 Nelson Hall*
*NCSU Box 7105*
*Raleigh, NC 27695-7105*

*Phone:* *(919) 515-3037*
*Fax:* *(919) 515-4416*
*Internet E-mail:* *james_anderson@ncsu.edu*

J. A. Anderson, *Dean*

R. D. Bereman, *Associate Dean*

T. E. H. Conway, *Associate Dean*

*Undergraduate Studies Staff:* E.W. Alexieff, J.A. Anderson, F.A.Artis, A.S. Bell, R.D. Bereman, J.Bong, A. Bryant, J.T. Callahan, R.A.E. Callanan. S.J. Cannon, C.N.Chafin, T.E.H.Conway, J.Donley, K.W.Gattis, R.L.Green, J.Hawkins-Morton, W.T.Hollomon, S.L. Joyner, S.S.Lamb, A.F.Mann, S.J.Matney, R.McGraw, L.R. McLaughlin, R.L.Mimms, Y.Modica-Turner, P.H.Mohr, P.A.Moses, D.E.Newman, J.E.Odom, T.L.Peterson, K.M.Proulx, D.E.Royal, B.A.Soloman, M.A.Tetro, A.S.Ugbaja, W.D.Weston, B.B.Windom.

The Division of Undergraduate Studies was formed in 1990 as a means to provide for the coordination of several programs designed to increase the retention and graduation rates of NC State undergraduates and to provide a focal point for new programs to enhance the undergraduate experience. The Division consists of several programs which are briefly described below.

### ACADEMIC SUPPORT PROGRAM FOR STUDENT ATHLETES
Reynolds Coliseum

P. Moses, *Director*

The Academic Support Program for Student Athletes is designed to provide academic support for more than 500 undergraduate and graduate students who represent NC State in NCAA competition. All student athletes are provided with advising and counseling support in order to allow students to balance the rigors of the academic course work with the rigors of competition at the NCAA Division I level.

## THE FIRST YEAR COLLEGE

Nelson Hall

R. D. Bereman, *Director*

The First Year College at North Carolina State University is a new approach to the development of a teaching and learning atmosphere which is focused on the critical interface period between high school and the end of the freshman year when new skills and habits must be developed. It is designed to compliment and support the role of the faculty in the education of new students. Housed administratively in the Division of Undergraduate Studies, it provides students with the intellectual environment to achieve academic success through an active learning process.

One focus is a residential component which will create a learning environment in the residence halls. The goals of the residential program are: (a) to build an intellectual community outside of the classroom; (b) to actively engage the students in that atmosphere;(c) to provide the support necessary to ensure the students have every opportunity for advice and thus success; (d) to build a community of scholars; and (e) to provide a site, mechanism, and environment for faculty and students to meet informally and engage in serious discussions.

The residential component also will be organized so that faculty and advisers will be available throughout the day and into the early evening to meet with students in offices in the residence halls. New academic peer advisers will provide upperclassman contact and support. Selected upper-class students reside in the residence halls. Academic advisers coordinate study centers and develop early intervention programs to ensure that freshman college students are on track for successful semesters early in the year. These advisers work with individual students to develop skills necessary to make a successful transition to a college environment. They will provide career advice and counseling, which when coupled with a cross curricula advising approach, allows students who are undecided about their choice of major the opportunity to explore multiple options before choosing.

Special emphasis is provided for groups within the First Year College which have special academic needs.

## NEW STUDENT ORIENTATION PROGRAM

Nelson Hall

R. A. E. Callanan, *Director*

New Student Orientation provides assistance to newly admitted first year and transfer undergraduate students. Primarily emphasized are personal, informational, procedural and programmatic issues and tasks related to students' transition to NC State. Orientation sessions coordinate access and interaction of students with both academic and student affairs' resources. The goal is to expose students to broad educational opportunities and to begin the process of integrating them into the life of the institution, thus promoting their ability to maximize the benefit of a successful college experience.

## UNDERGRADUATE STUDIES TUTORIAL CENTER

Nelson Hall

A. F. Mann, *Director*

The Undergraduate Studies Tutorial Center provides academic assistance to undergraduates enrolled in 100- and 200-level mathematics, science, and language classes. Students can meet weekly with one-on-one tutors or with sign-up tutors as needed. Supplemental Instruction (SI) leaders provide weekly help sessions for large lecture classes in chemistry, physics, and mathematics.

## UNIVERSITY COOPERATIVE EDUCATION PROGRAM

Peele Hall

W. D. Weston, *Director*

The University Cooperative Education Program is designed to be an integral part of a student's educational program and is offered in all colleges. The co-op program enriches and expands classroom learning by providing sponsored, paid work assignments in industry, business and government. Work experience is selected based on its relevance to a student's major or career goals and provides for alternating semesters of study and full-time work. A parallel plan (part-time study and part-time work) is also available as an option in several colleges. Co-op participation does not constitute an interruption of college work.

The co-op experience normally takes place during the sophomore and junior years and means that attaining a degree will take more than eight semesters. A minimum grade point average of 2.250 is required for students entering this program. Freshmen are not eligible, and transfers must first complete at least one semester at NC State.

Engineering students must have been admitted to a degree program. To remain in the program, students must maintain a minimum cumulative average of 2.000, agree to participate for a minimum of 12 months of full-time work experience or its equivalent, and be registered for co-op each work period.

## THE NC STATE WOMEN'S CENTER

Rhonda Mann, *Coordinator*

The NC State Women's Center, located in B-18 Nelson Hall, serves as a resource and referral center for campus and community programs and services for and about women and gender equity issues. The Center is administered through the Department of Student Development. The mission of the Center is to :

- Promote, support, and empower women on campus.
- Advocate for a university environment which eliminates barriers, diminishes prejudice and bigotry and extends a supportive climate to all women.
- Increase awareness and understanding of multicultural women's concerns and gender equity issues, including an emphasis on how these issues affect both women and men.
- Provide visibility for women, women's concerns, and women's contributions.

The NC State Women's Center provides resources for women and men at a time when gender roles are changing within the NC State University community and society at large. Emphasis is placed on empowering women as leaders and agents of change on campus with particular concern for issues of sexual violence, race/ethnicity, class, national origin, physical challenge/disability and sexual orientation. Specific programs, services, or student groups, such as the NETWORK mentoring program, HEAR Women, and the Women's Leadership Caucus, are designed to provide women students with peer support, leadership experiences, and positive role modeling. Such experiences create support networks for women students (many of whom are pursuing careers in fields not traditionally open to women), promote personal growth, and encourage a positive gender identity. Another student group, REAL Men, provides an avenue for male students to work, learn, and educate other men about issues regarding sexual assault.

Programs reflect a wide range of viewpoints about women's issues and gender equity. They are designed to increase understanding of gender issues, empower women to explore options in their lives and motivate both women and men toward

greater involvement in these issues. The Women's Center offers an array of programs for students throughout the school year, especially during March which is Women's History Month. For the faculty and staff women, the Women's Center offers a "Workshops for Women at Work" discussion series.

The office also provides confidential assistance, information and referrals for sexual harassment, sexual assault and domestic/relationship violence. The Coordinator of the Women's Center serves as a Sexual Harassment Resolution Officer and as an Advocate trained to respond to rape survivors.

The Rape & Sexual Assault Response Line is now available 24 hours a day, seven days a week and is answered by an Advocate. Advocates are trained volunteers who provide caring, confidential support as well as resources, referrals, and information for survivors of rape and sexual assault. Anyone who is dealing with a rape or sexual assault that happened recently or quite some time ago may call an Advocate for help and assistance. To reach an Advocate, call the Rape and Sexual Assault Response Line at **218-9102.**

For more information contact Rhonda S. Mann, Coordinator, B-18 Nelson Hall (corner of Dan Allen Drive and Hillsborough Street) at 515-2012.

# Graduate School

Peele Hall

D. W. Stewart, *Dean*

R. S. Sowell, *Associate Dean*

T. Melton, *Associate Dean*

M. F. King, *Associate Dean*

The Graduate School provides instruction and facilities for advanced study and research in the fields of agriculture and life sciences, design, education and psychology, engineering, forest resources, humanities and social sciences, management, physical and mathematical sciences, textiles, and veterinary medicine.

The school is currently composed of more than 2,000 graduate faculty members within the ten colleges. Educated at major universities throughout the world and established both in advanced teaching and research, these scholars guide the

University's graduate student body of some 5,150 men and women from all areas of the United States and many other countries.

The faculty and students have available exceptional facilities including libraries, laboratories, modern equipment, and special research areas.

For a list of graduate degrees offered at NC State and details on programs and admissions, consult the *Graduate Catalog.*

# Military Education and Training

The Department of Military Science (Army ROTC), the Department of Aerospace Studies (Air Force ROTC), and the Department of Naval Science (Naval ROTC) are separate academic and administrative subdivisions of the institution. Students in the ROTC programs will receive free elective credit for Aerospace Studies (AS), Military Science (MS), or Naval Science (NS) courses up to the limit of free electives in their curriculum.

## DEPARTMENT OF MILITARY SCIENCE (ARMY ROTC)

LTC David Cannon, *Professor*

*Instructors:* Major J. C. Simpson, Major S.A. Sloan, Major E. W. Timmons, Captain C.A. Redfield, Captain J. Wasko

**Mission.** The mission of the Army ROTC Program is to train college men and women to become commissioned officers in sufficient numbers to meet Active Army, Army Reserve, and National Guard requirements.

**Program of Instruction.** The Army ROTC program consists of a voluntary six-semester-hour Basic Course (freshmen and sophomore level) and a two-year Advanced Course (junior and senior level) which includes a six week camp in the summer prior to the senior year.

One may enter the Advanced Course without participating in the Basic Course by any of the following methods:

**Simultaneous Membership Program (SMP)**: Members of Reserve or National Guard units may take advantage of this program and, if accepted, enroll directly into the Advanced Course. SMP participants will be assigned to a unit near NC State or home for part-time monthly officer training and will receive the ROTC Advanced Course subsistence payment of $150 per month, plus approximately $150 per month for the one weekend of Reserve or Guard training. In addition, two weeks of Annual Training will be required for which the individual will receive full pay.

**Prior Service**: Service veterans are eligible for placement into the Advanced Course.

**Basic Summer Camp**: Successful completion of the six week basic summer camp, held at Ft. Knox, Kentucky, is an alternative to the basic course.

**Transfer Credit**: Students entering as transfer students from other institutions may receive credit for work completed at other Senior ROTC units.

**Junior ROTC**: Students who have participated in a Junior ROTC in high school may receive placement credit as determined by the Professor of Military Science.

**Eligibility:** All full-time freshmen and sophomores may enroll in any Military Science Basic Course offering without obligation to the Army. To be eligible for participation in the Advanced Course, applicants must be in good academic standing and demonstrate satisfactory performance in the Basic Course. Additionally, applicants for commissioning must be able to be commissioned by their 30th birthday; however, an age waiver may be obtained as long as the individual will be commissioned prior to his or her 34th birthday. A student must have a minimum of two years remaining as a full-time student at either the undergraduate or graduate level.

Professional Military Education: There are five Professional Military Education (PME) courses which must be taken or have an approval of a waiver obtained for them. All but one content area (Military History) are automatically met by completion of the University's General Education Distribution requirements. PME requirements must be completed or waived prior to commissioning.

**Delays for Graduate Study:** Qualified ROTC graduates may delay their entry into active service in order to obtain advanced academic degrees. Fellowships for advanced academic study are available to selected ROTC graduates, allowing up to two years of graduate study while receiving full pay and allowances plus payment for tuition, all fees, textbooks and required supplies.

**Financial Aid:** Army scholarships of two to four years which pay for tuition, all fees and textbooks are available on a competitive basis to students who are strongly motivated and academically qualified. Students in the Advanced Course who are preparing for commissioning receive a subsistence allowance of $100 per month (tax free) up to a maximum of $2000. All Advanced Course cadets are paid approximately one-half the basic pay of a second lieutenant, while attending the six-week Advanced Camp, plus travel allowances to and from camp.

**Service Opportunities:** Scholarship recipients may serve four years active duty upon commissioning or eight years in the United States Army Reserve or National Guard. Nonscholarship commissionees must serve three years on active duty or eight years with the Army Reserve or National Guard. Service consists of one weekend drill per month and two weeks annual training.

**Program Features:** Army ROTC classes are unique, offering instruction and a practical, working knowledge of leadership. Students are challenged early in their ROTC training to enable them to develop sound judgement, the desire to achieve, acceptance of responsibility, personal confidence, and to learn the principles of personnel management. The primary vehicle for this training during the academic year is Leadership Laboratory, where cadet officers and non-commissioned officers conduct instruction under the supervision of the Military Science Department's faculty. The intensive summer Advanced Camp is extremely effective in developing one emotionally, mentally and physically. All Army ROTC training is focused on preparing the student to meet the challenges of tomorrow's society, whether in a military or civilian career.

**Distinguished Military Students:** The University names outstanding Army ROTC students as Distinguished Military Graduates.

**Uniforms:** Uniforms for Army ROTC are provided by the federal government.

**Departmental Offices:** Our Administration Office is located in Room 154, Reynolds Coliseum. You may also visit our home page on the World Wide Web at: http://www2.ncsu.edu/ncsu/army_rotc.

# DEPARTMENT OF AEROSPACE STUDIES (AIR FORCE ROTC)

Colonel Robert Ostrander, *Professor*
*Instructors: Captain H. W. Brackins, Captain J. Doyle, Captain S. E. Heinlein*

**Program.** There is a four-year and a two-year program that leads to a commission in the United States Air Force (USAF).

The four-year program allows freshmen to enroll in Aerospace Studies courses in the same manner as other college courses for the first two years. Students take these courses as free electives and incur no military obligation unless they are receiving an AFROTC scholarship. These first two years are called the General Military Course (GMC). The last two years of AFROTC comprise the Professional Officer Course (POC). Non-AFROTC sophomore students may compete with GMC cadets for a position in the POC and obtain a commission under the two-year program.

The two-year program is available to those who do not take the first two years of Air Force ROTC. Interested students must contact the Professor of Aerospace Studies early in the first semester of their sophomore year. Accepted students will attend a six-week summer field training encampment (two-year program) or a four-week encampment (four-year program) before entering their junior year and the POC.

Students with a pilot allocation usually attend a flight instruction program during the summer following their junior year. This training is very similar to that available for obtaining a private pilot's license. Junior cadets may also apply for other special summer voluntary programs such as USAF Academy Freefall Parachute Training, British (RAF) Exchange Program, Army Airborne Training Program, Strategic Defense Initiative R & D Program, and other specialized professional development programs related to the cadet's future career area. Additionally, cadets have opportunities to examine all aspects of life in the Air Force and gain leadership experience through Air Force base visits, flying opportunities, summer programs, and social activities.

Upon graduation and satisfactory completion of the POC, the student is commissioned a second lieutenant in the USAF and is obliged to serve a minimum of four years on active duty.

**Financial Aid.** Air Force ROTC students are encouraged to apply for scholarships for two or three years. Scholarships pay for tuition, fees, books, and provide students $150 per month during the academic year for miscellaneous expenses. Scholarships are awarded by the Air Force based primarily on college academic achievement.

Students in the GMC, other than scholarship students, receive no monetary allowance. All POC students receive $150 per month during the academic year.

**Curriculum.** The AFROTC educational program provides professional preparation for future Air Force officers. During the first two years, courses will focus on a detailed study of the Air Force mission and organization, other military services, the evolution of Airpower concepts and doctrine, and the history of Airpower employment. During the last two years, the focus will be on leadership and management and an in-depth examination of National Security, American defense strategy and policy, and the methods for managing conflict. Throughout all four years a progressive development of communicative skills is integrated into each course. Officership is developed through leadership laboratory, traditional military social functions, base orientation trips, and cadet-centered programs.

**Eligibility.** All full-time freshman and sophomores may enroll in the GMC without obligation to the Air Force. To enter the POC students must pass an Air Force Officer Qualifications Test, meet physical and academic requirements, and be selected by the Professor of Aerospace Studies and Air Force ROTC headquarters. In addition, students must complete their degree and the POC before their 30th birthday. Veterans may obtain a waiver of maximum nonflying age requirement up to age 35.

Students desiring to enter the four-year program simply register for the freshmen Aerospace Studies course. Other students should contact the ROTC office on campus in Room 141 Reynolds Coliseum (919) 515-2417; or write to: Professor of Aerospace Studies, NC State, Box 7308, Raleigh, North Carolina 27695-7308.

**Organization.** The AFROTC Corps nicknamed "Wolfpack Warriors," is organized as a cadet wing staffed entirely by cadets for leadership development. They are assisted and advised by the instructors. Two collateral organizations, Arnold Air Society and Drill and Color Guard Team support the wing organization as well as the university.

**Uniforms.** Uniforms are provided by the federal government and are only worn on the day of Leadership Laboratory or as specified by the cadet corp leadership.

**Internet Access.** To view the Air Force ROTC Website, point your browser to the following addresses:

http://www2.ncsu.edu/ncsu/airforce_rotc/main.html **or**
http://www2.ncsu.edu/ncsu/stud_orgs/aas/

# NAVAL SCIENCE (NAVAL ROTC)

Captain Nicholas Taylor, *Professor*
*Associate Professor:* LT. Mark Leupold; *Instructors:* Captain Randall Connare, LT. Joe Sallee, LT. Nick Taylor

**Mission.** The purpose of the Naval ROTC Program is to provide a source of highly qualified and motivated naval officers, both men and women, to serve on surface ships, in aircraft, in submarines, or in the Marine Corps.

**4-Year NROTC Program.** There are basically two NROTC Programs leading to a commission as a Navy or Marine Officer upon graduation, the Scholarship Program and the College Program.

**Scholarship Program.** The Scholarship Program leads to a commission in the Navy or Marine Corps. For students who receive a Navy/Marine Corps scholarship, the Navy will pay tuition and fees, buy books, supply uniforms, and pay $150 per month tax-free subsistence allowance to help defray the cost of normal board at the University. During the summers between school years scholarship students will receive 4-6 weeks of at-sea training conducted on ships, submarines, and aircraft of the Navy's first line force. Upon graduation and commissioning, scholarship students are obligated to serve a minimum of four years on active duty.

**College Program.** For those students who are interested in a commission and do not desire a scholarship, or for those who are seeking an opportunity to qualify for a scholarship after entering NC State, the College Program is available. Selection for the College Program is made from students already enrolled at NC State, with applications being accepted and considered by the staff of the NROTC unit. Students enrolled in the College Program are provided uniforms and Naval Science textbooks. College Program students compete for selection to continue NROTC in Advanced Standing at the end of their sophomore year. Selection is based on academic and demonstrated professional performance. Those selected for Advanced Standing receive $150 per month subsistence allowance during the final two years of the program. College Program midshipmen receive a single summer training cruise between the junior and senior year. Except for administrative differences, no distinction is made between the Scholarship and College Program midshipmen. The minimum active duty commitment following graduation for a College Program student is three years.

Students in the College Program are eligible to compete for scholarships at regular intervals. Most College Program students who have demonstrated above average academic and professional performance in the unit have received scholarships.

**Two-Year Programs.** The Two-Year Programs offer an opportunity to participate in NROTC during the final two years of University study. Both Scholarship and College Programs exist, offering the same advantages to the student having two years of college remaining as the respective four-year programs.
Applications for this program must be completed by March 15 prior to the starting year. Upon selection, the candidate attends a six-week training course at Newport, Rhode Island, during the summer between the sophomore and junior years so that he or she may receive instruction in the Naval Science subjects normally covered in the first two years at the University. Participants in this training course receive uniforms, room and board, and officer candidate pay during the period and, upon satisfactory completion of training, enter the NROTC program as third year students. The application process can be time consuming. In order to meet the March 15 deadline, students are encouraged to contact the Department of Naval Science before December 1 of their sophomore year.

**The Marine Option.** A limited number of quotas are available for students who wish to enter either of the NROTC Programs as Marine Officer candidates. For others who may decide upon a Marine Corps commission after joining NROTC, selection for the Marine Option may be made in the sophomore year. A midshipman's status as a Marine Option will result in some modifications to the curriculum and the final summer training period.

**Curriculum.** Due to the increasingly advanced technologies being employed by the Navy and Marine Corps, candidates for Navy Commissions are encouraged to select academic majors in mathematics, engineering, or scientific disciplines. However, each student in the NROTC program is free to choose his or her area of major study.

The NROTC training program emphasizes academics, leadership, military organization, and physical fitness. Required Naval Science courses are fully accredited, taken for free elective credit and include Naval Orientation, Engineering, Weapons Systems, Navigation, Naval Operations, and Leadership and Management. Marine Option midshipmen substitute Evolution of Warfare and Amphibious Warfare for selected courses. Additional University courses may be required depending upon one's major; however, all Navy option scholarship midshipmen must complete one year of calculus and physics. In addition to the courses taken for University credit, midshipmen will attend one leadership laboratory period each week.

**Midshipmen Life.** Academic excellence is emphasized throughout the NROTC Program with commensurate participation in the full range of campus extra curricular activities. The NROTC unit is organized as a midshipmen battalion to facilitate leadership development. The battalion is staffed entirely by midshipmen under the

supervision of staff instructors. Additionally, midshipmen have opportunities to examine all aspects of life in the Navy and Marine Corps and gain leadership experience through field trips, summer cruise, sail training, and social activities. Further information regarding application for and admission into the NC State Naval ROTC may be obtained on campus in Room 102 Reynolds Coliseum or by writing to the Professor of Naval Science, Box 7310, NC State, Raleigh, North Carolina 27695-7310 or by calling (919) 515-2757/6216.

# Department of Music

*Price Music Center (Office: Room 203)*
*Campus Box 7311*
*Raleigh, NC 27695-7311*

*Telephone: (919) 515-2981*
*FAX: (919) 515-4204*
*E-mail:robert_petters@ncsu.edu*

R. B. Petters, *Director of Music*
J. C. Kramer, *Associate Director of Music*
*Assistant Directors:* R.M. Foy, J.A.Fuller, M.S. Lynch, D. R. Overmier, A..E. Sturgis, P.H. Vogel, E.B. Ward

The Music Department is committed to providing broad-based educational opportunities for NC State students through a variety of musical experiences and introductory and upper-level academic courses. Departmental faculty seek to assist students in developing musical insights, musical skills, and the capacity to perceive and respond to music in its historical and cultural contexts.

Opportunities for direct student participation as performers include many choral and instrumental organizations, which are described in detail under "Student Activities." Membership in any ensemble is open to students with a disciplined interest in music. Auditions are scheduled during summer orientation, at the beginning of each semester, and by appointment with the conductor of the group. For further information, please call the Music Department at 515-2981.

The department offers a variety of courses, most of which may be taken to fulfill specific general education requirements. Any course may be taken as a free elective. An eighteen-hour Music Minor is offered for qualified undergraduate students who wish to engage in the serious study of music. Emphases include performance, history/literature, and theory/composition.

The department also serves as a cultural resource for the university community and the public at large through concerts presents by student musical organizations, music faculty, and visiting artists. Concerts are open to students and the public.

# Department of Physical Education

Carmichael Gymnasium, Room 2000

A. Lynn Berle, *Interim Head*

*Professors Emeriti:* F.R. Drews, R.A. Lauffer; *Associate Professors:* S.V. Almekinders, A. Attarian, A.L. Berle, J.V. Brothers, H.LBrown, K.L. Davis, J.L. DeWitt, T.W. Evans, R.G. Gwyn, S.C. Halstead, V.M. Leath, C.E. Patch, G.W. Pollard, T.C. Roberts, J.L. Shannon, R.R. Smith; *Associate Professors Emeriti:* N.E. Cooper, J.M. Daniels, J.B. Edwards, A.M.Hoch, H.Keating, W.R.Leonhardt, W.H.Sonner; *Assistant Professors:* R.C. CombsJ.W. Isenhour, Jr., I.F. Ormond, III; *Assistant Professors Emeriti:* M.S. Rhodes, W.M. Shea, E.A. Smaltz; *Lecturers:* J.K. Bartlett, R.N. Bechtolt, A.L. Bell, D.I. Bonaccorsi, J.R. Bonner, T.A. Breen, J.R. Carroll, W.A. Cheek, K.K. Criswell, T.S. Dash, P.S. Domingue, J. Horne, R.H. Kidd, M.R. Lester, R.L. McElroy, B.P. Miller, C.S. Ousley, D.A. Rice, E.V. Smith, J.W. Stewart, R.H. Taylor, G.E. Wall, T.C. Winslow, G.R. Youtt; *Associate Members of the Faculty:* D.L. Ridgeway (Statistics and Physics), C.E. Stoddard.

All North Carolina State University students are required to complete two semesters of physical education to meet university requirements. Students must take any 100-level course in Fitness and Wellness as part of this requirement.

Students may participate in a sport they know or learn a totally new activity. Students with disabling conditions will be helped by physical education and Student Health Service professionals in choosing appropriate classes. Only "activity" courses, not elective "theory" courses, can be used to meet the university physical education requirement.

## MINOR IN FITNESS LEADERSHIP

The Department of Physical Education offers a 17-hour minor in Fitness Leadership. It is designed to prepare students to assume fitness leadership responsibilities based on sound exercise research, fitness concepts, and theoretical history. The minor will provide knowledge of nutrition, anatomical, physiological and basic biomechanical principles; background in the prevention and treatment of athletic injuries; development and evaluation of fitness programs using various exercise modes and equipment; and demonstrations of the ability to apply the skills learned through a practicum experience.

## MINOR IN OUTDOOR LEADERSHIP

The Department of Physical Education offers a 17-hour minor in Outdoor Leadership which is designed for undergraduate students desiring to pursue careers as outdoor leaders of adventure-based programs or for those who wish to enhance their personal development and enjoyment. Students obtaining this minor will develop a foundation of essential leadership skills and experiences through course work focusing on outdoor skills, leadership training, and leadership experiences.

## MINOR IN PHYSICAL EDUCATION - COACHING EMPHASIS

The Department of Physical Education offers a 20- to 22-hour Minor in Physical Education (Coaching Emphasis) designed to prepare students to assume coaching responsibilities with a sound theoretical background. The minor provides knowledge of pertinent anatomical, physiological, and biomechanical principles; appreciation for the prevention and treatment of athletic injuries; development of sports management skills; and demonstration of motor skills and strategies involved in coaching specific sports.

For further information, contact the Department of Physical Education at 515-2486.

# Office of Research, Outreach, Extension and Economic Development

C. G. Moreland, *Vice Chancellor*
R. Lea, *Associate Vice Chancellor for Research*
W.M. Crowell, *Associate Vice Chancellor for Technology Transfer and Industry Research*
S. L. Kirsch, *Associate Vice Chancellor for Outreach, Extension and Continuing Studies*
J.J. O'Neil, *Assistant Vice Chancellor for Research*

The Vice Chancellor for Research, Outreach, Extension and Economic Development acts for the Chancellor and Provost in the general administration of research, outreach, extension, continuing education and economic development of the university.

The Vice Chancellor acts as the principal liaison representative between granting agencies and the university; assists faculty, department heads, and deans in identifying support for their research programs, preparing and processing proposals, negotiating contracts, grants and cooperative agreements and developing intercollegiate and interinstitutional research programs and projects; manages the technology transfer activities of the university; administers the allocation of faculty research and extension development funds; advises the Provost and Vice Chancellor on the coordination of intercollegiate and interinstitutional research programs and facilities; and, provides general information on all grant and contract activities.

The Vice Chancellor coordinates the efforts of all college outreach programs and assists the Chancellor and the Provost and Vice Chancellor in relations with those persons, organizations, and agencies (local, state, regional and national) that desire outreach services of the university.

## DIVISION OF CONTINUING STUDIES

S. L. Kirsch, *Associate Vice Chancellor for Outreach, Extension and Continuing Studies*

Campus-wide coordination and communication for continuing education and distance learning are provided through the Division of Continuing Studies. In

carrying out these responsibilities, the division provides assistance in the identification of educational needs for non-traditional students, professionals, business, industry, and governmental agencies. Through its numerous credit and non-credit programs and courses, both on and off-campus, the division facilitates bringing together the educational needs of the people of North Carolina with the intellectual resources of the University. The division includes the following four units:

## ADULT CREDIT PROGRAMS AND SUMMER SESSIONS

J. F. Cudd Jr., *Director*

The **Office of Adult Credit Programs** recruits, registers, and provides student services to Undergraduate Studies (UGS) and Post- Baccalaureate Studies (PBS) students who enroll in the University's regularly scheduled day and evening classes. These non-degree students may take any course offered by the University, provided they satisfy any required prerequisites and space is available. Late afternoon and evening courses are offered primarily for the benefit of adults who are unable, because of time limitations, to attend day courses. Each semester, approximately 500 afternoon and evening courses are offered in over 60 subject areas. Ten undergraduate and thirteen graduate degrees may be completed by individuals enrolled solely in evening classes. Approximately 2,900 UGS and PBS students enroll each semester.

Using a variety of delivery systems, classes are offered across the state and throughout the United States. Methods include traditional, face-to-face instruction, as well as courses offered by various telecommunication mechanisms including satellite delivery, videocassette, and cablevision. Total enrollment in off campus credit courses for 1995-1996 was over 3,100.

Thirty-four courses in 13 subject areas are offered through the Independent Studies (correspondence) Program. Administration of the program is handled by the Office of Independent Studies of the Division of Continuing Education at UNC-Chapel Hill.

The **Summer Sessions** at NC State offer an extensive educational program planned to meet the varied needs and interests of approximately 13,500 students. Sixty-eight departments offer instruction in more than 975 courses, approximately 90 percent of which are at the undergraduate level. Each of the University's ten colleges and schools, with a combined faculty of more than 550, participates in the summer sessions. The schedule includes two "regular" five week sessions and a ten-week session and includes over 100 evening courses scheduled for the convenience of working adults.

Summer courses and special programs are designed for the new student, the undergraduate wanting to advance his or her academic standing at NC State, the graduate desiring to continue study and research during the summer months, and visiting students pursuing degrees at other institutions. Teachers who need to earn credit toward renewal of teaching certificates or advanced degrees in education and persons in professional fields who wish to keep abreast of new developments and trends also take advantage of NC State's summer programs.

For information regarding the summer sessions write: Director of Summer Sessions, Box 7401, NC State University, Raleigh, North Carolina 27695-7401.

## CENTER FOR URBAN AFFAIRS AND COMMUNITY DEVELOPMENT

Y.S. Brannon, *Director*

The Center for Urban Affairs and Community Services brings the research, educational, and extension resources of NC State to bear upon community problems associated with urbanization in North Carolina. In addition to providing direct services, such as applied research, education, and technical assistance, to local and state governments in the areas of social sciences, human services, policy analysis, and evaluation research, the center also: (1) provides experiential educational opportunities for graduate and undergraduate students and (2) develops and supports research opportunities for faculty and upper-level graduate students.

The Center for Urban Affairs and Community Services coordinates its work with other members of the University of North Carolina's Urban Studies programs through the Urban Studies Council. The council enables universities and other institutions across the state to pool their efforts to encourage productivity and responsiveness of government and community institutions.

## CONTINUING AND PROFESSIONAL EDUCATION

A. S. Warren, *Interim Director*

*Continuing Education Specialists*: B. Campbell, R. Grote, M. McKenzie, S. Moore, L. Patton, J. Tanner; *Client Relations Coordinator:* K. Miller

In keeping with the land grant tradition of the university, Continuing and Professional Education offers education and training to all the people. Programs include: agriculture, communication, data processing, economics, education, engineering, forestry, management, the physical sciences, recreation, textiles, and

veterinary medicine. Special efforts are made to meet the training needs of industry and government agencies. More than 500 courses are offered with registrations totaling over 13,250.

The university awards Continuing Education Units to participants in qualified programs. Continuing Education Units are part of a nationwide recording system to provide a uniform measure of attainment in noncredit educational programs. One CEU is defined as "ten contact hours of participation in an organized continuing education experience under responsible sponsorship, capable direction and qualified instruction."

The Jane S. McKimmon Center serves as the premier adult education facility in North Carolina. It provides program support services in pleasant surroundings conducive to the interchange of ideas and information. Since opening in June, 1976, the center's sixteen conference rooms have been used for more than 21,200 educational meetings - providing educational opportunities for more than 1.5 million adults from all walks of life.

## EMERGING ISSUES FORUM

B. Owen, *Director*

### Mission

The Emerging Issues Forum is a public service program designed to bring the highest levels of enlightened public policy debate to the people of North Carolina. To enrich the dialogue and promote informed decision-making on public issues, the forum regularly convenes symposia, conferences and discussion groups. Each spring, the Emerging Issues Forum (the program's premier event) brings North Carolina leaders together in a common arena with top thinkers, analysts and practitioners from across the nation and the world.

### Strategic Issues

Emerging Issues Forum programs consistently focus on broad categories of policy concern: education, the environment, and a range of societal issues, with special attention always focused on how the economy is affected by these broad categories. Observation and analysis of economic trends provide a thread of programmatic continuity from year to year.

### Programs

Four programs currently contribute to achieving the Emerging Issues Forum mission: The annual Emerging Issues Forum; International Trade Conferences; the Governor's Agricultural Summit; and a Teacher Leadership Development Project. One

additional program, the Public Policy Forum, is a model available for use by grassroots and non-profit groups. Individuals who want to involve a group in organized inquiry into some aspect of public policy may contact the Emerging Issues Forum for assistance.

## ENCORE CENTER FOR LIFELONG ENRICHMENT

D. S. Jackson, *Director*

Encore, a member-supported program of lifelong enrichment for people over 50, develops and presents a variety of learning experiences: non-credit courses, colloquia, study-action groups, a fitness program, and travel-learn opportunities. The program was developed during the 1990-91 fiscal year in response to the increasing number of third-age learners in the overall Raleigh-Wake County population. The integrity of Encore comes not only from the guidance of the Division of Continuing Studies but also from the older adults whose needs, interests, ideas, and experiences have given direction to Encore's mission of educational stimulation, personal enhancement, and community service.

## INSTRUCTIONAL TELECOMMUNICATIONS

T. L. Russell, *Director*

Selected credit courses, graduate and undergraduate, are delivered off campus to individuals and groups by means of several different television technologies - cable, microwave, satellite, and videocassette. Depending on the technology employed, courses, degrees, and certificates are available in the Raleigh/Wake County area while others are provided state-wide, nation-wide, and even globally. NC State colleges utilizing television to reach distant students include Agriculture and Life Sciences, Design, Education and Psychology, Engineering, Humanities and Social Sciences, Management, Physical and Mathematical Sciences, and Textiles. Information is available through the Office of Instructional Telecommunications.

## JANE S. McKIMMON CENTER FOR EXTENSION AND CONTINUING EDUCATION

The Jane S. McKimmon Center serves as the premier adult education facility in North Carolina. It provides program support services in pleasant surroundings conducive to the interchange of ideas and information. In the sixteen years since

opening in June, 1976, the center's sixteen conference rooms have been used for 16,725 educational meetings - bringing a total of 1.14 million adults from all walks of life to our campus for participation in an education activity.

## OFFICE OF UNIVERSITY ENVIRONMENTAL PROGRAMS AND INSTITUTE FOR ENVIRONMENTAL TECHNOLOGY EDUCATION (IETE)

R.I. Bruck, *Coordinator and Director*

The Office of the Coordinator and Director of IETE provides services to faculty and students regarding the vast array of environmental programs at NC State. Additionally, the coordinator acts as the primary university contact with business, industry, government and non-government organizations regarding academic, research and outreach programs addressing environmental topics. IETE has been established to partner with private sector and governmental agencies to develop and offer a wide range of non-credit continuing education unit (CEU) courses, workshops, and expositions in the emerging environmental management and technology arena. Its partnerships with the U.S. Environmental Training Institute (Washington D.C.) and the Environmental Industry Association's National Environmental Management and Education Center (Washington D.C.) has resulted in domestic and internationally-based environmental workshops on cutting-edge technologies and management strategies. Topics include pollution prevention, remediation, clean technologies, ISO 14,000, and environmental management. IETE works with state and federal government agencies and the World Trade Center to encourage technology transfer and economic development in the $420 billion dollar global environmental technology market.

## BIOTECHNOLOGY PROGRAM

M. A. Conkling, *Director*

The Biotechnology Program at NC State includes some 80 faculty representing 21 departments in the Colleges of Agriculture and Life Sciences, Engineering, Forest Resources, Physical and Mathematical Sciences, and Veterinary Medicine. The Program administers a Ph.D. minor in Biotechnology that may be taken by students who reside and conduct their research in one of the participating departments. To minor in Biotechnology, the student must complete at least six credit hours of biotechnology laboratory courses and must conduct graduate research in the area of biotechnology. Research in biotechnology is multidisciplinary encompassing three

main areas: molecular biology, bioprocessing/bioanalytical techniques, and *in vitro* cell culture.

## MATERIALS RESEARCH CENTER

R. F. Davis, *Director*

The Materials Research Center was established in 1984 at NC State as an interdisciplinary program involving persons representing the Departments of Chemistry, Electrical and Computer Engineering, Materials Science and Engineering, and Physics. The principal thrust area of the center involves fundamental studies in the epitaxy of compound semiconductors. The center serves as a focal point for this cooperative research. However, the experimental efforts are conducted within the four departments noted above.

## SEA GRANT COLLEGE PROGRAM

B. J. Copeland, *Director*

The North Carolina Sea Grant College Program is a state/federal partnership program involving all campuses of the UNC system. A majority of its activities, however, are conducted at NC State. Sea Grant combines the University's expertise in research, extension, and education to focus on practical solutions to coastal problems. Graduate and undergraduate research opportunities rest with individual project directors on campus and with a special fellowship program administered by the program office.

## WATER RESOURCES RESEARCH INSTITUTE

K. H. Reckhow, *Director*

The Water Resources Research Institute is a unit of the University of North Carolina System and is located on the campus of NC State.

The institute was established to promote a multi-disciplinary attack on water problems, to develop and support research in response to the needs of North Carolina, to encourage strengthened educational programs in water resources, to coordinate research and educational programs dealing with water resources, and to provide a link between the state and federal water resources agencies and related interests in the University.

Research and educational activities are conducted through established departments and schools of the university system. All senior colleges and universities in North Carolina are eligible to participate in the institute's research program.

# NCSU Libraries

S. K. Nutter, *Vice Provost and Director*
A. P. Dykeman, *Associate Director for Administrative Services and Organizational Development*
E. C. Filstrup, *Associate Director for Collection Management, Organization, and Preservation*
C. L. Gilreath, *Associate Director for Public Services*
J. Y. Davis, *Assistant Director for Planning and Research*
J. E. Ulmschneider, *Assistant Director for Information Technology*

The NCSU Libraries consists of the D. H. Hill Library and four branch libraries. It contains more than 2.500 million volumes of books, bound journals, and federal government publications, and more than 4.4 million microforms. The collections are particularly strong in the biological and physical sciences, engineering, agriculture, forestry, textiles, and architecture, with the arts, humanities, and social sciences also well represented. The Libraries regularly receives over 21,500 serials. Four special libraries - the **Burlington Textiles Library** in the College of Textiles complex, the **Harrye B. Lyons Design Library** in Brooks Hall, the **Natural Resources Library** in Jordan Hall, and the **Veterinary Medical Library** in Veterinary Medical Building - serve the special needs of their respective school and colleges. Also affiliated with the NCSU Libraries are the Learning Resources Library in Poe Hall and the African American Cultural Center Reading Room in the Witherspoon Student Center Annex.

The NCSU Libraries has been a depository for U.S. government publications since 1924 and receives over 88 percent of these publications. Beginning in 1992 the Libraries was designated a full depository for North Carolina government documents. The Libraries also receives the microfiche research reports published by the Department of Energy, the National Aeronautical and Space Administration (NASA), the Educational Resources Information Center (ERIC), and the National Technical Information Service (NTIS).

The online, author, title, and subject catalog permits rapid identification of monographs and serials in the collections of the NCSU Libraries as well as those of Duke University, UNC-Chapel Hill, and N.C. Central. This resource sharing greatly enhances the research capabilities of the NCSU Libraries and is made possible through the Libraries' participation in the Triangle Research Libraries Network (TRLN). An automated circulation system provides quick, easy check-out of books by borrowers.

A number of bibliographic and full-text databases are available through the NCSU Libraries Information System in online and CD-ROM format for searching by in-building and remote users at no charge. They cover all disciplines. In addition, the Libraries provides staff-assisted searching of hundreds of other online databases on a cost-recovery basis.

Facilities and equipment are also available for both individual and group use of audiovisual media. The D. H. Hill Library's theatre and group viewing rooms can be scheduled for presentations. The library has a large collection of video, audio, and multimedia titles for individual and class use, and films in the State Library's film collection can be borrowed for academic use by faculty and students. The Media Center is also equipped with audio and video equipment in carrels for group and individual viewing and listening.

Access to the NCSU Libraries Information System is available via http://www.lib.ncsu.edu/. This extensive web site provides information about the Libraries' collections and services, as well as serving as a gateway to Internet resources and locally mounted databases that are unequaled at most other research universities.

## LEARNING RESOURCES LIBRARY

M. A. Link, *Coordinator*
C. A. Cranford, *Assistant Coordinator*

The Learning Resources Library, administered by the College of Education and Psychology, is located in 400 Poe Hall. The library maintains a collection of education materials with particular emphasis on teaching methods, research, administration and psychology and includes films, filmstrips, slides, audiotapes, video cassettes, videodiscs, simulation games, and computer software. Audiovisual equipment is available for previewing materials in the library. The library acquires textbooks adopted by the State Board of Education for secondary level subjects as

well as other selected textbooks and reference materials. The mission of the library is to support programs in the College of Education and Psychology. Lending policies permit the use of certain materials by the larger campus community for instructional and research purposes.

# Academic Computing

W.E. Willis, *Vice Provost for Information Technology*
C.W. Malstrom, *Assistant Vice Provost for Information Technology*
S.F. Averitt, *Director of NCState.Net*
C.L. Kneifel, *Director of Computing Services*

NC State offers many computing resources and services to its students, including access to the campus-wide data communications network and distributed computing environment, the Internet, computing facilities, and computing help. Individual colleges and departments on campus also provide computing resources specifically for students in their curricula.

The University's high-speed fiber-optic data communications network currently interconnects over 10,000 computers on campus and provides direct connections to the Internet, including e-mail, ftp, telnet,and the resources of the World-Wide Web. In addition to the academic buildings and computing facilities that have direct data communications connections, on-campus residence halls are being wired, giving students the option of having direct Internet access from their rooms.

Unity/EOS is the campus-wide Unix-based distributed computing environment. Unity computing accounts (or EOS accounts for engineering students) are automatically generated for all students at NC State when they first register for classes. Unity/EOS accounts provide access to the campus-wide computing environment and the Internet, e-mail addresses, an allocation of network file space, the use of software on the network, and access to Unity computing labs. Instructions for logging in to accounts and finding help with learning the system are available in the labs as well as from Computing Services and online (see below).

Unity/EOS labs are equipped with Unix workstations with an X Window interface that is similar to Macintosh or Microsoft Windows applications. These labs provide direct access to the Unity/EOS computing environment. There are currently seven

Unity labs on campus: Building D, Avent Ferry Complex; 118 Daniels Hall;D.H. Hill Library (2nd Floor); 104 Hillsborough Building;119A North Hall; 103 Sullivan Residence Hall; and 33 Tucker Hall. Students with EOS accounts have access to EOS labs. Unity/EOS accounts and file space can also be accessed in text-only mode by telnet and dial-up services.

The University also maintains a large World-Wide Web site, which is becoming increasingly important for conveying information about NC State to the campus community and the world. Students can find out about grades, courses, campus events, and do research online at anytime of the day or night. The university's Home Page is at the URL: **http://www.ncsu.edu/**

More information about computing resources on campus can be found by clicking on "Computing Resources" or at the URL:
**http://www.ncsu.edu/comp_index.html.**

Online computing help is available at the following URLs:
**http://www.ncsu.edu/help**
**http://www2.ncsu.edu/ncsu/cc/pub/ccindex.html**
**http://www2.ncsu.edu/ncsu/cc/pub/unity.html**
**http://www.eos.ncsu.edu/manuals/**

Computing Services provides support for academic computing at NC State, including support for Unity/EOS, Unity/EOS computing accounts, and Unity computing labs. A team of expert computing consultants is available to help students learn and use the campus-wide computing environment. The Computing Services' Information Center is in Room 208 of the Hillsborough Building.

In addition to the computing resources available to all students on campus, individual colleges and departments offer computing facilities and classes specifically for students enrolled in their curricula. Students are encouraged to find out what computing resources are available to them from their departments.

# Research Triangle

The unique "Research Triangle" in North Carolina has captured national and international attention. It is comprised of the Research Triangle Park, a world renowned research park, and three major research universities. Because of this wealth of educational and research opportunities, the Triangle area contains the highest total of Ph.D. scientists and engineers per capita, in the nation. The Triangle universities - North Carolina State University, the University of North Carolina at Chapel Hill, and Duke University - have a subsidiary campus in the Research Triangle Park -the

Research Triangle Institute. The Institute, which operates as a contract research organization, has an annual research revenue of approximately $122 million.

The Research Triangle Park, founded in 1959, now has more than 59 public and private industrial research facilities, situated on 6,800 acres of land. Over 34,000 people work in the Park and over 30,000 additional jobs have been created outside the Park as a result of its existence. Organizations in the Park include such government facilities as the National Humanities Center, the National Institute of Environmental Health Sciences, the Environmental Protection Agency, and the National Center for Health Statistics. Private companies such as Glaxo Pharmaceuticals, Northern Telecom, and Reichhold Chemicals have their North American headquarters in the Park. Two major, state-supported research initiatives in Microelectronics and Biotechnology are located in the Park and North Carolina's Supercomputing Center is housed there as well. Faculty and graduate students from the universities work closely with many of the Park companies. Scientists and researchers from companies like Burroughs Wellcome, IBM, and Becton-Dickinson frequently hold adjunct appointments in one or another of the Triangle Universities.

# Research Centers and Facilities

## BIOLOGY FIELD LABORATORY

P. D. Doerr, *Director*

The Biology Field Laboratory is located six miles from the University campus and comprises two small streams, a 20 acre pond, 50 acres of varied terrestrial habitats and several laboratory buildings. Three hundred and fifty adjacent acres of timbered watershed managed by NC State in cooperation with the State Forest Service are also available for similar uses. The facilities, used for laboratory and field instruction and for undergraduate, graduate, and faculty research, are particularly suited for use by advanced classes in several biological science departments from the Colleges of Agriculture and Life Sciences and Forest Resources.

## CENTER FOR ADVANCED ELECTRONIC MATERIALS PROCESSING (AEMP)

J. R. Hanser, *Director*

The Center for Advanced Electronic Materials Processing was established in 1988 as a National Science Foundation Engineering Research Center. It also includes an SRC research program on Advanced Single Wafer Processing. The Center's program is interdisciplinary involving collaboration among chemists, physicists, materials scientists and electrical, chemical and mechanical engineers. The research focuses on the development of processing technologies capable of producing submicron electronic devices. The program emphasizes rapid thermal processing and low-temperature plasma-processing techniques. It is a joint effort involving researchers from the University of North Carolina (Chapel Hill), Duke University and North Carolina A&T State University. Undergraduate Scholar Awards are available for qualified undergraduates with interest in electronic materials and devices.

## CENTER FOR ASEPTIC PROCESSING AND PACKAGING STUDIES

K. R. Swartzel, *Managing Director*

The Center for Aseptic Processing and Packaging Studies was established in October 1987 to promote cooperative research between University and industrial researchers and to further scientific knowledge in areas of food and pharmaceutical

aseptic processing and packaging. The center is funded by the National Science Foundation, NC State and other universities, and industrial members from food, processing, and packaging industries. The objectives of the center are to support industrially relevant, fundamental research in aseptic processing and packaging; to enhance product quality and improve efficiency; and to communicate information gained from basic research to industry for development and marketing.

Students working on CAPPS projects will be exposed to industrial concerns and be given the opportunity to work first-hand with industry in solving problems and making practical application of their research. Cooperative research opportunities are available in the Department of Food Science at NC State and also at other universities.

## CENTER FOR ADVANCED COMPUTING AND COMMUNICATION

Wesley E. Snyder, *Director*

CACC is an NSF-sponsored Industry/University Cooperative Research Center with research sites at NC State University and Duke University. An advisory board comprised of representatives of member companies and government agencies meets twice a year to direct the Center's research activities. Faculty and graduate students also work closely with each member's technical staff on a variety of research projects. Current members include Bellcore, Bellsouth, Department of Defense, Ericsson Inc., IBM, NASA Lewis Laboratories, Naval Surface Warfare Center and US Air Force Rome Laboratories.

The Center's mission is to carry out basic and applied research on problems having both industrial and academic relevance, to transfer these results to our members, and to provide our students with a challenging educational opportunity. Our research goal is to create concepts, methods, and tools for use in the analysis, design, and implement of advanced computer and communication systems. CACC is uniquely equipped to serve as a testbed for new networking hardware, software, and protocols because of its state-of-the-art Networking, Multimedia and Imaging Laboratories.

## CENTER FOR RESEARCH AND DEVELOPMENT IN MATHEMATICS AND SCIENCE EDUCATION

S. B. Berenson, *Director*

The center, one of ten centers in the North Carolina Mathematics and Science Education Network, is the only research and development center in the network.

Established within the Department of Mathematics and Science Education in 1984, the center conducts research and development activities for precollege students, preservice teachers, inservice teachers, and University faculty. The center identifies areas of need in mathematics and science education and forms partnerships with federal, state, local and private funding agencies to work collaboratively to address the needs. Grants have been obtained from the National Science Foundation, Office of Education, State Department of Public Instruction, Local Education Agencies, the Ford Foundation, and IBM to introduce changes that incorporate technology and active learning into the mathematics and science curriculum, K-16. In addition, the center supports graduate students and provides them with opportunities to write grants and to design, conduct, and report on educational research.

## CENTER FOR RESEARCH IN SCIENTIFIC COMPUTATION

H. T. Banks, *Director*

The Center for Research in Scientific Computation (CRSC) is a formally recognized, multidisciplinary center of the greater University of North Carolina System. The CRSC is administered by NC State and the College of Physical and Mathematical Sciences. The purpose of the Center is to promote research in scientific computing and to provide a focal point for research in computational science, engineering, and applied mathematics. Data-massive and/or computationally intensive problems provide ideal projects for training graduate students in applied mathematics. With advanced computing methodologies students and post doctoral fellows address important issues in processes of modeling and design.

Research topics of interest to CRSC faculty include a variety of problems in scientific computation, numerical analysis, and numerical optimization with applications to such areas as fluid mechanics and flow control, smart materials and structures, nondestructive testing, acoustics, material sciences and manufacturing processes, population dynamics, environmental sciences, signal processing, computer performance evaluation and nuclear reactor physics.

## CENTER FOR SOUND AND VIBRATION

R. T. Nagel, *Director*

The Center for Sound and Vibration, established in 1969 and administered within the Department of Mechanical and Aerospace Engineering, comprises faculty pursuing the solution to a wide variety of vibration and acoustic problems occurring

in machinery and aircraft design. Graduate programs exist at M.S. and Ph.D. levels in such fields as noise and vibration control, structural acoustics, aeroacoustics, hearing conservation, computer aided machinery design, architectural and musical acoustics, and acoustic signal processing. Outstanding experimental facilities, which include large anechoic and reverberant rooms and computer graphics equipment, are available. The center's programs are financed largely by grants and contracts from industry and federal and state agencies.

## ELECTRIC POWER RESEARCH CENTER

J. J. Grainger, *Director, Electrical Area*
P. J. Turinsky, *Director, Nuclear Area*
W. E. Vickery, *Executive Director*

The Electric Power Research Center, established in 1985 within the NC State College of Engineering, is supported via membership fees, enhancement grants, and normal research contracts by organizations from the various sectors of the electric utility and power industry, including national laboratories and private interests. The purpose of the center is to collaborate in enhancing the excellence of a wide range of research and graduate-level degree programs in electric power systems from power generation to end usage. This primary purpose is accomplished by supporting interested faculty and students' involvement in basic and applied research directly relevant to the needs of the multifaceted electric power industry. Motivation to work with the center derives from the close University/membership interaction, the leverage afforded members via pooled resources, and the enhanced professional and research opportunities provided to faculty and students in electric power engineering.

The current research program involves faculty from the Department of Nuclear Engineering and the Department of Electrical and Computer Engineering.

## ELECTRON MICROSCOPE FACILITIES

There are four electron microscope facilities at NC State available to graduate students and faculty for research purposes. The College of Agriculture and Life Sciences Center for Electron Microscopy is located in Gardner Hall, the Engineering Research Microscope Facility is in Burlington Engineering Labs and the Department of Wood and Paper Science Electron Microscopy Lab is in Biltmore Hall. The

College of Veterinary Medicine Laboratory for Advanced Electron and Light Optical Methods (LAELOM) is located at 4700 Hillsborough Street in Raleigh.

J. M. Mackenzie Jr., *Coordinator, CALS Center for Electron Microscopy*

**The CALS Center for Electron Microscopy** has two transmission electron microscopes: a Philips 400T with STEM capabilities and equipped with a computer control system and a JEOL 100S. There are also two scanning electron microscopes - a Philips 505T and a JEOL T300, both of which can be computer controlled. All four electron microscopes are used in teaching and/or research. The Center is fully equipped for a range of biological specimen preparations, has two printing darkrooms, and offer complete service support in all areas of biological electron microscopy.

Formal graduate-level instruction is provided through the biological sciences curriculum in sample preparation, use of the electron microscopes, and production of electron micrographs. Training in advanced techniques is provided on an individual basis.

P. E. Russell, *Director, Engineering Analytical Instrumentation Facility*

**The Engineering Research Analytical Instrumentation Facility (AIF)** provides NC State faculty and students the best of the modern microanalysis instrumentation currently available as well as trained specialists to assist with instrument operation and experimental design. AIF is equipped with seven major research tools for the examination of metallurgical, ceramic, electronic and other materials. A Scanning Auger Microprobe (JEOL JAMP-30) and a Secondary Ion Mass Spectrometer (Cameca IMS 3F) provide surface analytical capability. The scanning auger microprobe is capable of surface analysis of the top three atomic layers of a solid material with a lateral resolution of 50 to 100 nanometers. In addition, the auger microprobe, equipped with an argon ion gun, provides in depth profiling analysis through thin films. The secondary ion mass spectrometer can perform elemental and isotope analysis to monolayer depths with part per million sensitivity and with lateral resolution of 1 micrometer. This system can also provide in depth profiling analysis which is especially important for implanted semiconductor analysis. Three 200KV transmission electron microscopes (a Hitachi H-800 Scanning Transmission Electron Microscope [ASTEM], a Topcon 002B high resolution Transmission Electron Microscope, a Topcon 002B Analytical Transmission Electron Microscope [ATEM]) provide spatial resolution down to 1.4Å on suitably prepared samples. The high voltage EM's enable the researcher to examine thicker specimens. The ASTEM and

ATEM are equipped with energy dispersive X-Ray (EDX) systems. The X-Ray analytical capability is used in conjunction with high resolution imaging for qualitative and quantitative elemental analysis of small amounts of material (down to cubic microns in bulk material and a few hundred nanometers in thin samples). The 002B ATEM is equipped with a low Z EDX system capable of light element detection down to beryllium. Two Scanning Electron Microscopes (a Hitachi S-530 and a JEOL 6400FE) are also available and are both equipped with energy dispersive X-Ray (EDX) detectors. The 6400FE is a low voltage, high resolution field emission SEM capable of 15Å resolution and is equipped with a light element EDX system which can detect low Z elements down to boron. Finally, AIF is completely equipped for specimen preparation and technical photography in the physical sciences.

E. A. Wheeler, *Coordinator, WPS Microscopy Lab*

**The Department of Wood and Paper Science Microscopy Lab** has equipment necessary for the preparation and study of specimens with light microscopy.

M. J. Dykstra, *Director, CVM Laboratory for Advanced Electron and Light Optical Methods*

**The CVM Laboratory for Advanced Electron and Light Optical Methods (CVM-LAELOM)** is a full-service facility providing clinical and research support for the CVM as well as the full NC State campus. The CVM-LAELOM houses a Philips 410LS transmission electron microscope and a JOEL JSM-35CF scanning electron microscope with all the necessary support equipment for tissue preparation as well as extensive darkroom facilities for the production of electron microscopy materials. The darkroom facility contains equipment for user-produced prints, 2 x 2 slides, 4 x 5 copy negatives, publication prints, posters, and film development. In addition, the CVM-LAELOM offers the use of an Olympus VANOX compound light microscope equipped for bright-field, epifluorescence and polarizing microscopy. A morphometry, digitizing and archiving package is coupled to the VANOX. A Wild photomacroscope is also available for viewing and photographing larger specimens with bright- and dark-field optics.

## HIGHLANDS BIOLOGICAL STATION

R. C. Bruce, *Director*

As an institutional member, NC State helps support the Highlands Biological Station, an inland field station located 3,823 feet above sea level in the heart of North

Carolina's southern Appalachians. The area has an extremely diverse biota and the highest rainfall in the eastern United States.

Facilities are available throughout the year for pre- and post-doctoral research in ecology, botany, zoology, soils and geology. Field-oriented research is supported by a laboratory building with research rooms and cubicles, a well equipped library, and five cottages and a dining hall located on the edge of a six-acre lake. The station owns 16 acres surrounding the lake as well as several tracts of undisturbed forested land. Natural areas in the Nantahala, Pisgah, Sumter, and Chattahoochee National Forests are readily accessible from the station. Research grants available through the station provide stipends for room, board, and research expenses.

Courses pertaining to field biology are offered at the advanced undergraduate-graduate level in the summer months. Credit is available through either UNC-Chapel Hill or Western Carolina University.

## INSTITUTE OF STATISTICS

T. M. Gerig, *Director*

The Institute of Statistics is composed of two sections, one at Raleigh and the other at Chapel Hill. At NC State, the institute provides extensive collaborative and advisory services in experiment design, data management, data analysis, mathematical modeling and statistical computing to the University community and beyond. The institute has interactions with state and federal agencies and with private industries.

## INTEGRATED MANUFACTURING SYSTEMS ENGINEERING INSTITUTE

The Integrated Manufacturing Systems Engineering Institute was established at NC State in 1984 to provide a multifaceted educational, research, and technology transfer initiative in manufacturing systems engineering. The objectives of this program are to educate engineers in the theory and practice of advanced design and manufacturing methods at the master's degree level; to conduct basic and applied research on topics related to contemporary manufacturing problems; and to engage in technology transfer to increase productivity and improve the quality of manufactured products.

The central goals of the institute are to integrate computer-aided processes into the design and control of manufacturing facilities enabling them to produce manufactured goods of improved quality at lowered cost. Through both internally and externally funded research projects the institute helps solve generic manufacturing systems engineering problems and provides a vehicle for technology transfer.

## MARS MISSION RESEARCH CENTER

Gerald Walberg, *Director*

The Mars Mission Research Center is one of nine University Space Engineering Research Centers established by NASA in 1988 to broaden the nation's engineering capability to meet the critical needs of the civilian space program. The goal of the center is to focus on educational and research technologies used in the design of spacecraft for advanced space missions. The program involves faculty, undergraduate and graduate students from several different colleges at NC State. The research is a cross-disciplined program involving (1) hypersonic aerodynamics and propulsion, (2) composite materials and fabrication, (3) light-weight structures, (4) spacecraft controls, and (5) space missions analysis and design. Students and faculty conduct part of their research at NASA Centers and participating industries.

## NORTH CAROLINA JAPAN CENTER

J. Sylvester Jr., *Director*

The North Carolina Japan Center was established in 1980 at NC State to strengthen academic, scientific, economic, and cultural ties between Japan and North Carolina. The center also helps conduct the formal exchange NC State has with Nagoya University, a major national scientific university in Japan.

Under the North Carolina Japan Fellows program, 41 professors and staff have taken a year of Japanese language training and then worked in Japan for a half year with Japanese colleagues in their specialty. They use their Japanese experience in their teaching and research, and they participate in the activities of the center and of the state in its relations with Japan.

The center offers introductory and advanced levels of Japanese language for students and gives special seminars for businessmen and others interested in Japan. Public lectures are given on Japan by members of the staff and the Fellows. Various films dealing with modern Japan and North Carolina's ties with Japan have been prepared for teacher training, public television, and Japanese companies interested in investment in North Carolina. The center has raised an endowment in memory of former Provost Harry Kelly and his contribution to United States-Japan scientific ties. The funds are used for scholarships for NC State students to take special intensive programs in the Japanese language. The center also works with American companies selling to Japan and Japanese firms locating in North Carolina.

## NUCLEAR SERVICES

J. N. Weaver, *Manager*

Specialized nuclear service facilities are available to the University faculty, students, state and federal agencies, and industry. The purpose of these facilities is to further the use of nuclear energy in engineering research and in scientific and public service programs. The facilities include: a 1 megawatt steady-state, pool-type, research reactor (PULSTAR) with a variety of test facilities; a neutron activation analysis and radioisotope laboratory equipped with three ORTEC 919 Gamma Spectrometry Systems coupled to ten GeLi solid-state detectors, two LEPD detectors and two 5" NaI detectors; a prompt gamma facility; a neutron depth profile facility; a neutron radiography facility, a low level counting laboratory equipped with liquid scintillation systems, radon systems, alpha spectrometry systems and an oxidizer; intermediate hot laboratories with hoods, junior caves and glove boxes; transuranic nuclear materials laboratory and computing and photographic rooms.

Nuclear Services also provides short courses in radioactivity usage, laboratory experiments for related courses in other departments, plus scholarships and part-time employment for students in the Nuclear Engineering curricula.

The 50,000 square-foot Burlington Engineering Laboratories complex houses the Department of Nuclear Engineering and the Department of Materials Science and Engineering with their associated offices and laboratories. All of the facilities including the Pulstar reactor are on the NC State campus.

## OAK RIDGE ASSOCIATED UNIVERSITIES (ORAU)

NC State has been a sponsoring institution of Oak Ridge Associated Universities (ORAU) since 1949. ORAU is a private, not-for-profit consortium of colleges and universities and a management and operating contractor for the U.S. Department of Energy (DOE) with principal offices located in Oak Ridge, Tennessee. Founded in 1946, ORAU provides and develops capabilities critical to the nation's technology infrastructure, particularly in energy, education, health, and the environment. ORAU works with and for its member institutions to help faculty and students gain access to federal research facilities; to keep members informed about opportunities for fellowship, scholarship, and research appointments; and to organize research alliances among our members in areas where their collective strengths can be focused on issues of national importance. Contact Jack H. Britt, 919-829-4213 for more information about ORAU programs.

## PESTICIDE RESIDUE RESEARCH LABORATORY

R. B. Leidy, *Director*

The Pesticide Residue Research Laboratory is a facility in the College of Agriculture and Life Sciences devoted to research on pesticide residues in air, plants, soils, water and other entities of man's environment. Although the laboratory is administered through the Department of Toxicology, it provides pesticide residue analyses for research projects in all departments of the college.

Not only does the laboratory perform interdepartmental residue research, but faculty in the laboratory also conduct independent pesticide research on persistence and decomposition of pesticides in air, soils and plants, absorption and translocation in plants, distribution in the environment, and contamination of streams, estuaries and ground water.

## PLANT DISEASE AND INSECT CLINIC

R. K. Jones, *Director*

The Plant Disease and Insect Clinic (PDIC) provides a unique diagnostic and educational service to plant growers in North Carolina. It is an integral part of the extension program in the Plant Pathology and Entomology Departments. The PDIC receives approximately 8,000 problem samples each year. County Agents, Extension Specialists and growers submit samples from agricultural crops, forests, urban gardens, house plants, etc. This provides an opportunity to observe and work with practical problems currently developing and causing damage.

There are constant and increasingly rapid changes taking place in agricultural technology. These changes influence pest problems that require new types of assays and more sophisticated laboratory examinations. Plant problems must be correctly diagnosed and proper control strategies employed as quickly as possible for growers to minimize losses. The PDIC provides a vital link between the numerous highly specialized resources and faculty members at NC State and the practical plant problems in the field. New or unusual outbreaks of plant diseases and insects can be quickly detected through the PDIC.

## PRECISION ENGINEERING CENTER

Thomas A. Dow, *Director*

The Precision Engineering Center, established in 1982, is a multidisciplinary research and graduate education program dedicated to providing new technology for high precision manufacturing. It encompasses measurement and fabrication of optical, electronic or mechanical devices where the tolerances required for operation are extremely tight. Projects involve improved mechanical designs and control algorithms, novel actuators, unique fabrication and measurement techniques and high-speed controllers to implement these concepts. With support from government and industry, the PEC pulls together faculty, staff and students from across the University to develop new ideas and to transfer those ideas into US industry..

## SOUTHEASTERN PLANT ENVIRONMENT LABORATORY--PHYTOTRON

J. F. Thomas, *Director*

The Southeastern Plant Laboratory, commonly called the phytotron, is a laboratory especially designed for research dealing with the response of biological organisms to their environment. The high degree of control makes it possible to duplicate any climate from tropical rain forests to arid desert.

The NC State phytotron concentrates on applied and basic research related to agricultural problems encountered in the southeastern United States. The ability to control all phases of the environment, however, allows inclusion of research dealing with all aspects of plant science.

The facilities are available to the resident research staff, participants in NC State's graduate research program and to domestic and foreign visiting scientists.

## TRIANGLE UNIVERSITIES NUCLEAR LABORATORY

Werner Tornow, *Director*

TUNL is a laboratory for nuclear physics research, funded by the US Department of Energy. Located on the campus of Duke University in Durham, the laboratory is staffed by faculty members and students from Duke University, UNC-Chapel Hill and NC State. There is extensive collaboration between the participating universities and with visiting physicists from the United States and abroad. The accelerators are a 15-MeV tandem Van de Graaff accelerator and a 4-MeV Van de Graaff accelerator. Polarized and pulsed beams are available as well as cryogenically polarized targets.

In addition, TUNL physicists perform experiments at major national and international nuclear physics facilities. More information on TUNL is available on the World Wide Web. The URL address is http://www.tunl.duke.edu.

# University Advancement

J. P. McNeill, *Vice Chancellor for University Advancement*

The mission of University Advancement at NC State is to facilitate communication internally and externally in order to enhance the overall image of the University; to provide meaningful programs and services to alumni and friends; to encourage service, support, participation and ambassadorship from constituents; to build and sustain a strong volunteer leadership network; to raise money from private sources; to maintain the alumni database and gift record system; and to coordinate with The UNC General Administration in support of government and legislative activities in Raleigh and Washington.

## ADVANCEMENT SERVICES

The Office of Advancement Services manages and supervises all University Advancement administrative service functions. These service functions include budget expenditures and procedures, financial analysis, computer data systems, gift processing, gift reporting, prospect research, and proposal writing. Advancement Services maintains and operates the alumni-donor database for the university.

## ALUMNI RELATIONS

The Office of Alumni Relations provides services to the university's alumni, involves alumni in the university's advancement as an educational institution, and provides alumni with a forum to express their views on the university. The office communicates with alumni through various publications; organizes alumni activities such as reunions, tours and area meetings; and informs alumni of educational opportunities and other services available to them from their alma mater. The NC State Alumni Association is a non-profit organization administered by the staff of the Office of Alumni Relations.

Students and parents are invited to visit the Office of Alumni Relations, located in the Alumni Memorial Building on Pullen Road. To inquire about programs of service, call (919) 515-3375 or (800) NCS-ALUM; or write the NC State Office of

Alumni Relations, Box 7503, NC State University, Raleigh, North Carolina 27695-7503.

**DEVELOPMENT**

The mission of the Office of University Development is to secure private financial support for benefit of priority academic projects and programs from individuals (alumni, parents, students, and friends), corporations, philanthropic foundations, and other organizations at the least cost in an ethical manner through the colleges, schools, and units at North Carolina State University.

University Development's primary focus is to emphasize the creation and implementation of market-driven policies, procedures, strategies and tactics, effectively mobilize volunteers, emphasize higher giving levels, encourage collaboration among colleges, with adequate funding, to foster the investment of private support for unprecedented positive impact on NC State's teaching, research and extension priorities for the 21st century.

These organizations and units serve as the primary fund-raising entities of North Carolina State University:

College of Humanities and Social Sciences
College of Management
Division of Undergraduate Studies
Graduate School
N.C. 4-H Development Fund, Inc.
N.C. Agricultural Foundation, Inc.
N.C. Dairy Foundation, Inc.
N.C. Engineering Foundation, Inc.
N.C. Forestry Foundation, Inc.
N.C. Textiles Foundation, Inc.
N.C. Tobacco Foundation, Inc.
N.C. Veterinary Medical Foundation, Inc.
N.C. State Alumni Association, Inc.
N.C. State Education and Psychology Foundation, Inc.
N.C. State Endowment Fund
N.C. State Foundation, Inc.
N.C. State Physical and Mathematical Sciences Foundation, Inc.
N.C. State Student Aid Association, Inc. / Wolfpack Club
Pulp and Paper Foundation, Inc.
School of Design
University Libraries
Visual and Performing Arts Program

## PUBLIC AFFAIRS

The Office of Public Affairs conveys the character and excellence of the University to its external and internal constituencies on behalf of the Chancellor, the Administration, and the Faculty; coordinates and supports the communications and marketing efforts of the Colleges, Schools, and Administrative Divisions; and ensures that the electronic and print media have access to complete and accurate information about the University. Public Affairs is divided into two offices. The Office of News Services works with journalists and publishes the *Bulletin* The Office of Creative Services provides video and multi-media production, publication production, and marketing services.

## HISTORY OF THE UNIVERSITY OF NORTH CAROLINA

In North Carolina, all the public educational institutions that grant baccalaureate degrees are part of the University of North Carolina. North Carolina State University is one of the 16 constituent institutions of the multi-campus state university.

The University of North Carolina, chartered by the N.C. General Assembly, in 1789, was the first public university in the United States to open its doors and the only one to graduate students in the eighteenth century. The first class was admitted in Chapel Hill in 1795. For the next 136 years, the only campus of the University of North Carolina was at Chapel Hill.

In 1877, the N.C. General Assembly began sponsoring additional institutions of higher education, diverse in origin and purpose. Five were historically black institutions, and another was founded to educate American Indians. Several were created to prepare teachers for the public schools. Others had a technological emphasis. One was a training school for performing artists.

In 1931, the N.C. General Assembly redefined the University of North Carolina to include three state-supported institutions: the campus at Chapel Hill (now the University of North Carolina at Chapel Hill), North Carolina State College (now North Carolina State University at Raleigh), and Women's College (now the University of North Carolina at Greensboro). The new multi-campus University operated with one board of trustees and one president. By 1969, three additional campuses had joined the University through legislative action: the University of North Carolina at Charlotte, the University of North Carolina at Asheville, and the University of North Carolina at Wilmington.

In 1971, the General Assembly passed legislation bringing into the University of North Carolina the state's ten remaining public senior institutions, each of which had until then been legally separate: Appalachian State University, East Carolina University, Elizabeth City State University, Fayetteville State University, North Carolina Agricultural and Technical State University, North Carolina Central University, the North Carolina School of the Arts, Pembroke State University, Western Carolina University, and Winston-Salem State University. This action created the current 16-campus University. (In 1985, the North Carolina School of

Science and Mathematics, a residential high school for gifted students, was declared an affiliated school of the University; and in 1996, Pembroke State University was renamed The University of North Carolina at Pembroke through legislative action.)

The UNC Board of Governors is the policy-making body legally charged with "the general determination, control, supervision, management, and governance of all affairs of the constituent institutions." It elects the president, who administers the University. The 32 voting members of the Board of Governors are elected by the General Assembly for four-year terms. Former board chairmen and board members who are former governors of North Carolina may continue to serve for limited periods as non-voting members emeriti. The president of the UNC Association of Student Governments, or that student's designee, is also a non-voting member.

Each of the 16 constituent institutions is headed by a chancellor, who is chosen by the Board of Governors on the president's nomination and is responsible to the president. Each institution has a board of trustees, consisting of eight members elected by the Board of Governors, four appointed by the governor, and the president of the student body, who serves ex-officio. (The NC School of the Arts has two additional ex-officio members.) Each board of trustees holds extensive powers over academic and other operations of its institution on delegation from the Board of Governors.

## UNC BOARD OF GOVERNORS

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Benjamin S. Ruffin, *Vice Chairman*
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Lois G. Britt
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John A. Garwood
Wallace N. Hyde
Jack P. Jordan
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D. Samuel Neill
Ellen S. Newbold
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Earl N. Phillips Jr.
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Paul J. Rizzo
Benjamin S. Ruffin
Joseph E. Thomas

*Members Emerti*
James E. Holshouser Jr.
Samuel H. Poole
*Ex-Officio*
John E. Dervin

## OFFICERS OF THE UNIVERSITY OF NORTH CAROLINA

C.D. Spangler Jr., B.S., M.B.A., D.H.L., LL.D. - President
Roy Carroll, B.A., M.A., Ph.D. - Vice President, Academic Affairs
Judith Pulley, B.A., M.A., Ph.D. - Vice President, Planning
Nathan Simms Jr., B.S., M.S., Ph.D. - Vice President, Student Services and Special Programs
William O. McCoy, B.S., M.S., - Vice President, Finance
Jasper D. Memory, B.S., Ph.D. - Vice President, Research and Public Service
David G. Martin, B.A., LL.B. - Vice President, Public Affairs
Rosalind R. Fuse-Hall, B.S., J.D. - Secretary to the University
Richard H. Robinson Jr., A.B., LL.B. - Assistant to the President
Gary Barnes, B.A., M.S., Ph.D. - Vice President, Program Assessment and Public Service

## NORTH CAROLINA STATE UNIVERSITY
## AN HISTORICAL SKETCH

On March 7,1887, the North Carolina General Assembly passed the act which authorized the establishment of the North Carolina College of Agriculture and Mechanic Arts. The Watauga Club of Raleigh and the statewide farmers' movement had convinced the legislature of the need to transfer the funds received by the state under the provisions of the Morrill Land-Grant Act of 1862 from the University of North Carolina in Chapel Hill to a new land-grant college in Raleigh. The cornerstone of A. and M. College was laid in August, 1888, and its doors were officially opened on October 3, 1889.

**Alexander Q. Holladay**, the college's first president (1889-1899), and a faculty of five offered courses in agriculture, horticulture, pure and agricultural chemistry, English, bookkeeping, history, mathematics, physics, practical mechanics, and military science. The first freshman class numbered about fifty students. By the end of the institution's first decade the resident enrollment had reached 300.

During the administration of **George T. Winston** (1899-1908) a new curriculum in textiles was developed and normal courses were offered in the summer for public school teachers, both men and women. The Agricultural Extension Service was established during the administration of **Daniel H. Hill** (1908-1916) and enrollment grew to more than 700. In 1917, during the administration of **Wallace C. Riddick** (1916-1923), the institution's name was changed to North Carolina State College of Agriculture and Engineering. The introduction of the word engineering was intended to reflect the increasing emphasis on the professional and theoretical as well as the practical aspects of technical education.

In 1923, a major reorganization of the administration of the college was begun, and President Riddick resigned to become the first dean of the new School of Engineering. **Eugene Clyde Brooks** (1923-1934), the fifth president of State College, continued the reorganization with the creation of the School of Agriculture (later renamed the School of Agriculture and Forestry), the School of Science and Business, the School of Education, the School of Textiles, and the Graduate School. Resident enrollment rose to nearly 2,000 in 1929 before the Depression caused a drop to approximately 1,500 in 1933. The first women graduates of State College received their degrees in 1927.

In the midst of the Depression the General Assembly of 1931 attempted to promote economy and to prevent unnecessary duplication among the three leading state institutions of higher education by establishing a single consolidated administration

for the University of North Carolina in Chapel Hill, North Carolina State College of Agriculture and Engineering, and North Carolina College for Women in Greensboro. Dr. Frank Porter Graham, president of the University of North Carolina, was elected president of the consolidated university, and Dr. Brooks, with the title of vice president, continued as chief administrative officer at State College. Among the consequences of consolidation were the phasing out of the School of Engineering at Chapel Hill and the School of Science and Business at Raleigh. A general college, later called the Basic Division, was established to provide two years of basic courses in humanities, social sciences, and natural sciences as a foundation for students in the various degree-granting technical and professional schools.

Colonel **John W. Harrelson** (1934-1953), Class of 1909, was the first alumnus to become administrative head of State College. Under the consolidated organization his title was Dean of Administration; later it was changed to Chancellor. During Harrelson's administration, the institution experienced the beginning of extraordinary growth in the aftermath of World War II. Two new schools were established: the School of Design and the School of Forestry. A multi-million dollar expansion program was completed during the administration of **Carey H. Bostian** (1953-1959), and the program of student activities was greatly enlarged, as the enrollment passed 5,000.

The faculty and student population more than doubled during the administration of **John T. Caldwell** (1959-1975) and another new school was organized: the School of Physical Sciences and Applied Mathematics (now Physical and Mathematical Sciences). The School of General Studies, the successor to the Basic Division, was renamed the School of Liberal Arts and was authorized to offer a full range of bachelor's and master's degree programs in the humanities and social sciences. The name of the institution itself was changed in 1965 to North Carolina State University, signifying its new role as a comprehensive university.

NC State's enrollment passed 20,000 during the administration of Chancellor **Joab L. Thomas** (1976-1981). The School of Veterinary Medicine was established, the name of the School of Liberal Arts was changed to School of Humanities and Social Sciences, and North Carolina State University was recognized as one of two major research universities within the statewide University of North Carolina.

**Bruce R. Poulton** (1982-1990) became chancellor in the fall of 1982. A major expansion of the University's research budget, the establishment of a substantial endowment to provide enlarged resources for research equipment and endowed professorships, and the addition of the 1,000-acre Centennial Campus occurred during this administration. All of the schools were renamed colleges except for the School of

Design and The Graduate School. In addition, the School of Education became the College of Education and Psychology.

In 1990, **Larry K. Monteith,** an alumnus and former Dean of the College of Engineering, became chancellor and NC State's eleventh chief administrative officer. Among his early initiatives were the creation of the Division of Undergraduate Studies and the First Year Experience Program. In 1992, the College of Management was established, and plans for a freshman college have recently been formalized.

An Institutional Advancement Division, now known as University Advancement, was organized to include alumni relations, university relations, development, and advancement services. A Board of Visitors has been created, comprised of nationally prominent scholars and business leaders, to advise the chancellor and Board of Trustees.

The College of Textiles and ABB (Asea Brown Boveri), NC State's first corporate partner, moved to Centennial Campus in 1991. Since then, the Centennial Campus celebrated its 10th anniversary and surpassed the $100 million mark in construction. The Engineering Graduate Research Center is newest building on that campus.

In 1994, NC State was authorized to establish the Zeta Chapter of the Phi Beta Kappa Society.

# MISSION OF NORTH CAROLINA STATE UNIVERSITY*

The mission of North Carolina State University is to serve its students and the people of North Carolina as a Research I, land-grant university. Through the active integration of teaching, research, and extension, North Carolina State University creates an innovative learning environment that stresses mastery of fundamentals, intellectual discipline, creativity, problem solving, and responsibility. Enhancing it's historic strengths in agriculture, science, and engineering with a commitment to excellence in a comprehensive range of academic disciplines, North Carolina State University provides leadership for intellectual, cultural, social, economic, and technological development within the state, the nation and the world.

* Approved by the North Carolina State University Board of Trustees on April 19, 1996.

# POLICY ON ILLEGAL DRUGS

*The following policy on illegal drugs was adopted by the North Carolina State University Board of Trustees on April 16, 1988:*

**Purpose**

Reflecting its concern over the threat which illegal drugs constitute to higher education communities, the Board of Governors of the University of North Carolina adopted a policy on illegal drugs on January 15, 1988. The Board of Governors' policy requires each constituent institution's Board of Trustees to develop a policy on illegal drugs applicable to all students, faculty members, administrators and other employees. The policy for each campus must address particular circumstances and needs while being fully consistent with specified minimum requirements for enforcement and penalties.

To assist NC State in its continuing efforts to meet the threat of illegal drugs, and to comply with the Board of Governors' policy, the Board of Trustees adopts the policy set forth below. This policy is intended to demonstrate the University's primary commitment to education, counseling, rehabilitation, and elimination of illegal drugs, as well as its determination to impose penalties in the event of violation of state and federal drug laws consistent with all due process protection rights.

**Education, Counseling, and Rehabilitation**

NC State shall maintain a program of education designed to help all members of the University community avoid involvement with illegal drugs. The educational program shall emphasize the incompatibility of the use or sale of illegal drugs with the goals of the University, the legal consequences of involvement with illegal drugs, the medical and psychological implications of the use of illegal drugs, and the ways in which illegal drugs jeopardize an individual's present accomplishments and future opportunities. Specific elements of the education program are:

1. Publicizing the University's policy in the Student Code of Conduct, the undergraduate and graduate catalogs, and other publications distributed to students, faculty administrators, and other employees. The latter publications include the official bulletin, the Student Handbook, the Faculty Handbook, the Handbook for Advising and Teaching, and the Human Resources newsletter.
2. Continuing and expanding the drug education program conducted by Student Health Service.

3. Continuing development of courses on drug education.

4. Continuing the drug education component of the employees' Wellness Program.

5. Increasing the awareness and utilization of the University's Employee Assistance Program (EAP).

The University shall disseminate information about drug counseling and rehabilitation services that are available to members of the University community. Persons who voluntarily avail themselves of such services shall be assured that applicable professional standards of confidentiality will be observed and that such participation will not be the basis for disciplinary action. Specific counseling and rehabilitation efforts include:

1. Continuing the evaluation and referral services of the Counseling Center for out-patient and in-patient rehabilitation.

2. Continuing the consultation and evaluation portions of the Student Health Service's drug education program.

3. Utilizing the Employee Assistance Program's referral to existing community-based counseling and rehabilitation services.

**Enforcement and Penalties**

Students, faculty members, administrators, and other employees are responsible, as citizens, for knowing about and complying with the provisions of North Carolina law that make it a crime to possess, sell, deliver, or manufacture those drugs designated collectively as "controlled substances" in Article 5 of Chapter 90 of the North Carolina General Statutes. The University will initiate its own disciplinary proceeding against a student, faculty member, administrator, or other employee when the offense is deemed to affect the interests of the University. Penalties will be imposed by the University in accordance with procedural safeguards applicable to disciplinary actions against students, faculty members, administrators, and other employees, as required by Section 502D(3) and Section 603 of the University Code, by Board of Governors' policies applicable to other employees exempt from the State Personnel Act, and by regulations of the State Personnel Commission. The penalties to be imposed by the University may range from written warnings with probationary status to expulsions from enrollment and discharges from employment. However, the following minimum penalties, as prescribed by the Board of Governors, shall be imposed for the particular offenses described.

*Trafficking in Illegal Drugs*

1. For the illegal manufacture, sale or delivery, or possession with intent to manufacture, sell or deliver, of any controlled substance identified in Schedule 1, N.C. General Statutes 90-89, or Schedule 11, N. C. General Statutes 90-90 (including, but not limited to, heroin, mescaline, lysergic acid diethylamide, opium, cocaine, amphetamine, methaqualone), any student shall be expelled and any faculty member, administrator or other employee shall be discharged.

2. For a first offense involving the illegal manufacture, sale or delivery, or possession with intent to manufacture, sell or deliver, of any controlled substance identified in Schedules III through VI, N.C. General Statutes 90-91 through 90-94 (including, but not limited to, marijuana, phenobarbital, codeine), the minimum penalty shall be suspension from enrollment or from employment for a period of at least one semester or its equivalent.* (Employees subject to the State Personnel Act are governed by regulations of the State Personnel Commission. Because the minimum penalty specified in this section and required by the Board of Governors exceeds the maximum period of suspension without pay that is permitted by the State Personnel Commission regulations, the penalty for a first offense for employees subject to the State Personnel Act is discharge.) For a second offense, any student shall be expelled and any faculty member, administrator, or other employee shall be discharged.

*Illegal Possession of Drugs*

1. For a first offense involving the illegal possession of any controlled substance identified in Schedule I, N.C. General Statutes 90-89, or Schedule II, N.C. General Statutes 90-90, the minimum penalty shall be suspension from enrollment or from employment for a period of at least one semester or its equivalent.* *(See * above)*

2. For a first offense involving the illegal possession of any controlled substance identified in Schedules III through VI, N.C. General Statutes 90-91 through 90-94, the minimum penalty shall be probation, for a period to be determined on a case-by-case basis. A person on probation must agree to participate in a drug education and counseling program, consent to regular drug testing, and accept such other conditions and restrictions, including a program of community service, as the Chancellor or the Chancellor's designee deems appropriate. Refusal or failure to abide by the terms of probation shall result in suspension from enrollment or from employment for any unexpired balance of the prescribed period of probation.

3. For second or other subsequent offenses involving the illegal possession of controlled substances, progressively more severe penalties shall be imposed, including expulsion of students and discharge of faculty members, administrators or other employees.

*Suspension Pending Final Disposition*

When a student, faculty member, administrator, or other employee has been charged by the University with a violation of policies concerning illegal drugs, he or she may be suspended from enrollment or employment before initiation or completion of regular disciplinary proceedings if, assuming the truth of the charges, the Chancellor or, in the Chancellor's absence, the Chancellor's designee concludes that the person's continued presence within the University community would constitute a clear and immediate danger to the health or welfare of other members of the University community; provided, that if such a suspension is imposed, and appropriate hearing of the charges against the suspended person shall be held as prompt as possible thereafter.

**Coordinator of Drug Education**

The University Counsel will serve as coordinator of drug education and, acting under the authority of the Chancellor, will be responsible for overseeing all actions and programs relating to this institutional policy.

**Implementation and Reporting**

This North Carolina State University policy on illegal drugs became effective the beginning of the fall semester of 1988.

Annually, the Chancellor shall submit to the Board of Trustees a report on campus activities related to illegal drugs for the preceding year. The report shall include, as a minimum, the following: (1) a listing of the major education activities conducted during the year; (2) a report on any illegal drug-related incidents, including any sanctions imposed; (3) an assessment by the Chancellor of the effectiveness of thecampus program, and (4) any proposed changes in the policy on illegal drugs. A copy of the report shall be provided to the President.

## NORTH CAROLINA STATE UNIVERSITY BOARD OF TRUSTEES

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Robert T. Zimmer, *President, NC State Student Body*

## NORTH CAROLINA STATE UNIVERSITY ADMINISTRATIVE COUNCIL

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Phillip J. Stiles, *Provost and Vice Chancellor*
Jeffrey P. McNeill, *Vice Chancellor for University Advancement*
George Worsley, *Vice Chancellor for Finance and Business*
Charles G. Moreland, *Vice Chancellor for Research, Outreach, Extension and Economic Development*
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James A. Anderson, *Vice Provost and Dean of Undergraduate Studies*
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George H. Wahl Jr.,*Chair-Elect, Faculty Senate*
Carl D. Fulp, *Chair, Staff Senate*
Greg Holden, *Chair-elect, Staff Senate*
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Harold B. Hopfenberg, *Director, Kenan Institute for Engineering, Technology and Science*
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June M. Brotherton, *Assistant to the Chancellor*
John T. Kanipe Jr., *Secretary of the University*
Cleon F. Thompson Jr., *Special Assistant to the Chancellor*
Mark A. Nippert, *NC State Student Senate President*
Robert T. Zimmer, *NC State Student Body President*

# TEACHING, RESEARCH, EXTENSION FACULTY, AND OTHER ACADEMIC PERSONNEL

**Abad, Jorge A.**; Research Associate (Postdoctoral), Plant Pathology; Ph.D, NC State University, Raleigh

**Abbate, Angelo Rudy**; Professor, Landscape Architecture Department; MLA, University of Pennsylvania, Philadelphia

**Abbott, John Parsons**; Librarian, NCSU Libraries-Administration; MLS, Florida State University

**Abbott, Lisa T.**; Librarian, NCSU Libraries-Administration; MLS, Florida State University

**Abdullahi, Ahmad-Rufai**; Research Associate, Dept. of Anatomy, Physiological Sci., Radiology; DVM, Ahmado Bello University

**Aberman, Harold M.**; Adjunct Assistant Professor, Dept. of Companion Animal & Spec.Species Medicine; DVM, Purdue University

**Aboelfotoh, Mohamed O**; Visiting Scientist, Materials Engineering; Ph.D, University of California, Berkeley

**Aborisade, Oladimeji**; Visiting Professor, Political Science; Ph.D, Claremont Graduate School

**Abrams, Charlie F. Jr.**; Professor, Biological and Agricultural Engineering; Senior Associate Provost, Associate Provost - Academic Affairs; Ph.D, NC State University, Raleigh

**Abt, Robert C**; Associate Professor, Forestry - General; Ph.D, University of California, Berkeley

**Adams, Dewey A**; Professor, Department of Occupational Education; Ed.D, University of Florida

**Adams, J. Peter**; Adjunct Professor, Food Science; Ph.D, University ofWisconsin, Madison

**Adams, Stacie H**; Extension Assistant, Home Economics (NCSU); BA, East Carolina University

**Ade, Harald**; Assistant Professor, Physics; Ph.D, SUNY at Stonybrook

**Adler, Diane F.**; Lecturer, Foreign Languages and Literatures; BA, SUNY College at Buffalo

**Adler, Kenneth B.**; Professor, Dept. of Anatomy, Physiological Sci., Radiology; Ph.D, University of Vermont & State Agricultural College

**Adler, William**; Associate Professor, Philosophy and Religion; Ph.D, University of Pennsylvania, Philadelphia

***Afify, Elsayed M.**; Professor, Mechanical & Aerospace Engineering; Ph.D, University of Michigan, Ann Arbor

**Agrawal, Anup**; Associate Professor, Economics-College of Management; Ph.D, Pittsburgh State University

**Agrawal, Dharma P.**; Professor, Electrical Engineering; DSC, Federal Institute of Technology

**Agris, Paul F.**; Professor, Biochemistry; Ph.D, Mass. Institute of Technology

**Ahmad, Shuaib H.**; Professor, Civil Engineering; Ph.D, Univerisity of Illinois, Chicago Circle

**Aiman-Smith, Lynda**; Assistant Professor, Business Management-Coll of Mgmt; Ph.D, Purdue University

**Akley, Nancy J.**; Lab Supervisor and Research Asst., Dept. of Anatomy, Physiological Sci., Radiology; BS, Simmons College

**Akroyd, Duane**; Associate Professor, Department of Occupational Education; Ph.D, Southern Illinois University, Carbondale

**Al-Shannag, Mohammad J**; Research Associate (Postdoctoral), Civil Engineering; Ph.D, University of Michigan, Ann Arbor

**Albaugh, Timothy J.**; Research Associate, Forestry - General; MF, Duke University

**Albright, Daniel J**; Adjunct Assistant Professor, Dept. of Companion Animal & Spec.Species Medicine; MD, Louisiana State University Medical Center

**Alchediak, James**; Lecturer, Communication; Program Manager, Communication; MA, Ohio University

**Alder, Ruth A.**; Associate Professor, Foreign Languages and Literatures; Ph.D, University of Pittsburgh

**Alderman, Cheryl K**; Lecturer, Industrial Engineering; Interim Director, Engineering-Academic Affairs; ME, NC State University, Raleigh

***Alexander, Samuel T.**; Associate Professor, Electrical Engineering; Ph.D, NC State University, Raleigh

**Alexander, Winser E.**; Professor, Electrical Engineering; Ph.D, University of New Mexico

**Alexieff, Elizabeth W**; Visiting Lecturer, Multidisciplinary Studies (MDS); Academic Advisor, First Year College; MA, Appalachian State University

**Allen, Brenda F.**; Coordinator, College of Textiles-Dean's Office; DED, NC State University, Raleigh

**Allen, George C**; Senior Researcher, Botany; Ph.D, NC State University, Raleigh

**Allen, Howard Lee**; Professor, Forestry - General; Director, Forestry - Coop - Fertilization; Ph.D, NC State University, Raleigh

**Allen, Janice B**; Research Assistant Professor, Dept. of Anatomy, Physiological Sci., Radiology; Ph.D, NC State University, Raleigh

**Allen, Jonathan**; Associate Professor, Food Science; Ph.D, University of Georgia

**Allen, Nina S**; Professor, Botany; MS, University of Maryland, College Park

**Allen, Steven G.**; Professor, Economics-College of Management; Program Director, Business Management-Coll of Mgmt; Ph.D, Harvard University

**Allen, William D.**; Visiting Assistant Professor, Electrical Engineering; MSEE, University of Kentucky

*NC State Academy of Outstanding Teachers Member
** Board of Governor's Award Winner

**Allison, Beecher C.**; Extension Specialist, Animal Science (Husbandry); MS, NC State University, Raleigh

**Allona, Isabel**; Postdoctoral Fellow, Biotechnology Research - Forestry; Ph.D

**Almekinders, Sally Vanmetre**; Associate Professor, Physical Education; M.Ed, University of Miami

**Almond, Glen William**; Associate Professor, Dept. of Food Animal and Equine Medicine; DVM, Ontario Veterinary College

**Alonso, Silvia T.**; Associate Professor, Foreign Languages and Literatures; Ph.D, University of NC, Chapel Hill

**Alston-Mills, Brenda P**; Associate Professor, Animal Science (Husbandry); Ph.D, Michigan State University

**Altier, Craig**; Assistant Professor, Dept. of Microbiology, Pathology & Parasitology; DVM, Ohio State University

**Amatya, Devendra M**; Research Associate (Postdoctoral), Biological and Agricultural Engineering; Ph.D, NC State University, Raleigh

***Ambrose, John T.**; Professor, Entomology; Ph.D, Cornel University Endowed Colleges

**Ambrose, William G**; Adjunct Assistant Professor; Ph.D, University of NC, Chapel Hill

**Amerson, Henry V.**; Associate Professor, Forestry - General; Ph.D, NC State University, Raleigh

**Amiran, Eyal Y**; Associate Professor, English; Ph.D, University of Virginia

**Amoozegar, Aziz**; Professor, Soil Science; Ph.D, University of Arizona

***Anderson, Dorothy**; Visiting Assistant Professor, Department of Counselor Education; Ed.D, Vanderbilt University

**Anderson, James A**; Professor, Dept. of Math & Science Education; Vice Provost and Dean, Undergraduate Studies-Dean's Office; Ph.D, Cornell University Statutory C

**Anderson, John R. Jr.**; Professor, Crop Science; Ph.D, University of Illinois,Urbana

**Anderson, Kenneth E**; Associate Professor, Poultry Science; Extension Specialist, Poultry Science; Ph.D, Kansas State University Agriculture & Applied Science

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